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ABSTRACT

The document reports a study to determine if there is a higher incidence of behavior disorders or language differences in a group of 50 2-year-old Ss who have multiple minor physical anomalies as compared to a group with four or fewer anomalies, and to determine if there is a significant correlation between behavior disorders and language development delays or disorders. Chapter I contains sections which include information on the problem, purposes of the study, definition of terms, and limitations of the study. A literature review comprises Chapter II focusing on five major areas: need for early identification of at risk children, minor physical anomalies research, hyperactive behavior disorders, language development, and language disorders. A third chapter summarizes study methods and procedures, which include selection of the sample, instrumentation, and data analysis. Among findings reported in Chapter IV are that anomalies scores alone did not predict those 2-year-old children who evidenced behavior disorders or language differences and that a high anomaly score at 1 year combined with obstetrical complications significantly related to hyperactive behavior at 2 years. A final chapter discusses results and considers implications of the study. Appended materials include a list of anomalies and scoring weights, information on the Developmental Sentence Analysis, and sample recording forms. (SBH)

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MINOR PHYSICAL ANOMALIES AND LANGUAGE AND BEHAVIOR OF SELECTED TWO-YEAR OLD CHILREN

July, 1978

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

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CHAPTER I

THE PROBLEM

Infant screening for at risk children has been perceived throughout the United States as a logical extension of health care. Forty-three states have legislation requiring the screening of all newborns for phenylketonuria and four additional states do so voluntarily. In 1967, an amendment was added to the Social Security Act requiring the health screening of all children on Medicaid. The legislation establishing national sickle cell screening is further recognition of the importance of early assessment of developmental disorders (Camp, 1975).

Systematic early identification of infants and children at risk of being or becoming developmentally disabled is potentially the most important means available for ameliorating the impact of exceptionality. Problems that are identified early are presumably the most amenable to treatment and habilitation. Developmental disorders which go unrecognized may prevent a child from achieving optimal growth and development. An essential correlate to the identification of an at risk population is the responsibility for more careful study of those children and for the implementation of appropriate intervention that will prevent environmental compounding of their problems or will ameliorate or remediate the disabling condition.

The hope is that if at risk children are detected while they are young, diagnosis may be made earlier and treatment begun

as soon as possible. Among children who yield significant differences through screening, and who are subsequently found to have actual developmental delays and disorders, intervention may prove to be more effective for the child, more rewarding for the professional, and more cost effective for the society at large.

The National Advisory Committee on the Handicapped indicates that the most dramatic breakthroughs bearing on the prevention of handicapping conditions can be expected to come from medical, genetic, and pharmacological studies. The Commission also recognizes the critical importance of early intervention for young exceptional children to ensure the development of their fullest potential. The present investigation provides evidence as to the usefulness of a screening device administered during infancy to identify children who are at risk of developing disorders in behavior or differences in language.

Statement of the Problem

Research must be conducted to develop a useful data-based screening device for the early identification of children who are at risk of becoming behavior disordered or language disordered or delayed. Early detection of existing or potential developmental disorders in language and behavior will facilitate the planning of appropriate intervention programs to prevent or remediate serious disabilities. Programs can be designed that beneficially affect the child's cognitive abilities, social development, and family dynamics.

In our quest for knowledge concerning the etiology, characteristics, and factors that influence the development of the exceptional child, all relationships must be carefully considered. In recent years concern for accurate early identification of developmental disorders in young children has been seen in such disciplines as genetics, pediatrics, neurology, psychology, and education although the cause(s) and course of disorders or differences in behavior and language development continue to be a subject of speculation.

There has been a growing interest within medical genetics and pediatrics in the relationship between congenital anomalies which are identifiable at birth and other developmental deviations, particularly of the central nervous system. Studies over the past two decades of minor physical anomalies are of great interest to investigators of behavioral development. These anomalies may represent a valuable clue to the occurrence of altered embryonic development which, in turn, may result in genetically determined developmental disorders. The present study assesses the ability of a screening examination for minor physical anomalies administered at birth and at one year to indicate developmental differences in language and disorders in behavior among two year old children.

Purposes of the Study

This investigation was designed to yield data which would generally augment the understanding of developmental differences in language and disorders in behavior. It was designed to provide evidence supporting the value of a

particular screening technique for early identification of such disorders or differences.

The primary purpose of this study is to determine if there is a higher incidence of behavior disorders or language differences in a group of two-year old subjects who have multiple minor physical anomalies as compared to a group of subjects with four or less anomalies.

The secondary purpose of this investigation is to determine if there is a significant correlation between behavior disorders and language development delays or disorders in selected two-year old subjects.

The Sample

The research sample is composed of 50 two-year old children who were screened at birth for presence of minor physical anomalies. These 50 subjects are members of a research population of 933 white, normal, middle class infants born at Georgetown University Hospital during 1974-1975. Infants from the "high" (n = 42) and "low" (n = 55) anomaly groups were evaluated at one and two years of age at the Georgetown University Hospital Child Development Clinic, at which times developmental and behavioral data were collected by raters blind to anomaly scores. A complete description of the population and an ordered succession of collected data concerning the sample are provided in Chapter III.

Definition of Terms

1. At risk is a term applied to children who are quite likely to have a developmental problem or unmet need

(Frankenberg, 1977).

2. Screening is the "presumptive identification of unrecognized disease or defects by the application of tests, examinations, or other procedures which can be applied rapidly and economically to large populations of people" (Frankenburg, 1977, p. 14).

3. Intervention refers to any form of programming, such as environmental modification or language therapy, deliberately undertaken to produce better growth conditions and to avoid or ameliorate disabling effects of exceptionality.

4. Minor physical anomalies (MPAs) are physical characteristics which are neither medically nor cosmetically significant to the individual and are, therefore, easily overlooked. Minor physical anomalies include such factors as the following: head circumference out of normal range; epicanthus, widely spaced eyes; curved fifth finger; adherent ear lobes; and a wide gap between first and second toes. See Appendix A for a complete list of anomalies and scoring weights.

5. High anomaly score indicates that a subject evidences five or more of the possible minor physical anomalies.

6. Low anomaly score indicates that a subject has four or less of the possible anomalies.

7. Multiple anomalies is another term for high anomaly score. The two terms will be used interchangeably.

8. Language difference is used in this study to indicate that a child's expressive language development is different from that of other children who are approximately

the same chronological age. There is much disagreement concerning the label, definition, and measurement of the language of children who are developing language in a manner which is different from their peers. The term "language difference" was chosen because it lacks the negative tone which such labels as language deviance or deficits connote. For the purposes of this study, language difference is used as a universal term, i.e., children who are language different can be classified as language delayed or language disordered.

9. Language delay is used in this study to identify children who appear to be following the expected pattern of language development at a slower pace than their peers. Specifically, these children are consistently producing utterances which consist of less than two words. The language of children whose utterances are less than two words - children identified as language delayed - is analyzed according to Lee's (1974) Developmental Sentence Analysis. Children with language delay may also have a language disorder which is difficult to identify because of the limited length and complexity of their utterances.

10. Language disorder is used in this study to identify children who appear to be developing language which does not follow the expected pattern of development or which fails to incorporate some of the semantic-grammatical rules which are present in the emerging language of normally developing children. The child with a language disorder fails to use one or more rules or fails to use three rules - Agent + Action,

Action + Object, and X + Locative - more frequently than the other possible rules. Specifically, if less than 50% of a child's semantic-grammatical rules as analyzed by the Environmental Language Inventory, are categorized as Agent + Action, Action + Object, and X + Locative, that child is considered language disordered.

11. Semantic-grammatical rules are the ten rules which govern the semantic or functional relations between word classes which, in turn, combine in certain orders in the emerging language of normally developing children. The rules apply to words reflecting semantic roles such as agent, action, and modifier. The operational definitions of the semantic-grammatical rules described by MacDonald (1974), author of the Environmental Language Inventory, are included in Appendix B.

12. Behavior disordered is used in this study to indicate those children who received a high "Total Behavior Disturbed" rating on the Preschool Behavior Questionnaire (PBQ). This Total score is derived from observer ratings of the following categories of behavior:

A. Hostile-Aggressive - Characterized by such behaviors as being inconsiderate of others, fighting, kicking, biting, and hitting others.

B. Anxious - Characterized by tending to be fearful of new things or situations; appearing miserable, unhappy, tearful, or distressed; and crying easily.

C. Hyperactive-Distractible - Characterized by being inattentive; having poor concentration; running about or jumping

up and down.

13. Obstetrical complications is a term used to indicate that the subject's mother has a history of bleeding during pregnancy or a previous miscarriage (Quinn, Renfield, Burg, and Rapoport, 1977).

14. Positive family history is used in this study to indicate that a subject's sibling or half-sibling has been professionally diagnosed and treated for either a behavior or learning problem or that a parent has repeated a grade or has had a specific learning disability and/or behavior disorder requiring intervention.

Limitations of the Study

The population for this study includes only those white, private care infants born at the Georgetown University Medical Center during the 14-month period from June 1, 1974 to September 1, 1975. All members of the population are from intact families. The subjects of this investigation are the children of parents who signed a consent form at the time of birth authorizing ongoing developmental evaluation through age three years.

The language samples and behavioral scorings discussed herein were collected during a 90 minute home visit. The focus of language assessment was on a subject's expressive language abilities, with only limited attention given to receptive skills. The behaviors rated are those included on the Preschool Behavior Questionnaire.

Research Hypotheses

1. The group of two-year old subjects with multiple minor physical anomalies (five or more) will show a significantly higher incidence of behavior disorders as measured by the Preschool Behavior Questionnaire than the subjects with low (four or less) minor physical anomaly scores.

2. The group of subjects with multiple minor physical anomalies, and a history of obstetrical complications or a family history of learning and/or behavior problems will show a significantly higher incidence of behavior disorders as measured by the Preschool Behavior Questionnaire than the subjects with low minor physical anomaly scores.

3. The group of two-year old subjects with multiple minor anomalies will have a significantly higher incidence of different language development as measured by the Environmental Language Inventory [1/] or Developmental Sentence Analysis than the subjects with low minor physical anomaly scores.

4. The group of subjects with multiple minor physical anomalies, and a history of obstetrical complications or family history of learning and/or behavior problems will have a significantly higher incidence of delayed and disordered language functioning as measured by the Environmental Language

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1/ The Environmental Language Inventory (ELI) provides an analysis of the semantic-grammatical rules present in the spontaneous, elicited, and imitative language of a subject. ELI was used to assess the language development of all subjects who had multiple word utterances. The language of subjects who used mostly one-word utterances (i.e., less than 90 words in their 50 utterances sample) was assessed by the Developmental Sentence Analysis.

Inventory or Developmental Sentence Analysis than the subjects with low minor physical anomaly scores.

5. There will be a positive correlation between a high "Behavior Disturbed" score on the Preschool Behavior Questionnaire and different language development as measured by the Environmental Language Inventory or Developmental Sentence Analysis.

Extension and Addition to a Current Project

The project discussed herein was done in conjunction with a three-year research study being completed at the Child Development Center of the Georgetown University Hospital. National Institute of Health funding for "Biological Factors in Hyperactivity" (HEW PHS Grant #MH 20802) was granted to Judith Rapoport, M.D. for the year ending May 31, 1977. An Easter Seal Research Foundation grant awarded to Patricia Quinn, M.D. also supported the clinical investigation of "Minor Physical Anomalies and Early Developmental Deviation" (July 1, 1976 - June 30, 1977). The Bureau of Education for the Handicapped awarded the investigator of the present study a research grant (HEW #OEG-0-77-0011) for a 12 month period ending February 28, 1978).

By providing naturalistic behavior data through the use of the Preschool Behavior Questionnaire, the present study extends the scope of the Quinn-Rapoport project. By assessing the subjects' language development, the present study provides an important developmental variable to the larger project.

Basic Assumptions

For the purposes of this study it will be assumed that the language and behavior observed and evaluated during a period of 60 to 90 minutes in a child's home is representative of that child's language abilities and behavior performance. It is also assumed that the Preschool Behavior Questionnaire (PBQ), designed for and normed on children three to six-years old, is appropriate for the two-year old sample of the present study. This is considered a reasonable assumption because the PBQ has been used in other investigations of two-year old children (Behar, 1977).

Significance of the Study

The literature cites the critical lack of, and urgent need for, research concerning the identification of infants and young children at risk of becoming developmentally disordered. Diagnostic techniques for identifying the risk factors that characterize and shape early disordered development must be developed. Early identification of at risk children will enable appropriate intervention to be implemented. Young children with language differences and behavior disorders are at risk of long-term difficulties, both academic and interpersonal. Undetected and untreated developmental disorders can become self-perpetuating and increasingly complex. The establishment of a valid means for identifying infants who are at risk of language, learning, or behavior disorders will at the very least permit preventive or ameliorative early intervention efforts (Tjossem, 1976). The earliest possible detection

and intervention will help those children to achieve their full potential. The present investigation provides evidence concerning the value of a particular screening technique for early identification of such disorders.

A series of recent studies (Quinn and Rapoport, 1974; Rosenberg and Weller, 1973; Steg and Rapoport, 1975; and Waldrop and Halverson, 1971) have noted a connection between the presence of multiple minor physical anomalies (MPAs) and behavior and/or learning problems in early and middle childhood. Minor physical anomalies are detectable at birth and are stable through middle childhood (Waldrop and Halverson, 1971). The assessment of MPAs in the neonate, alone or in combination with some background variables, may be useful to identify infants at risk of developmental or behavioral disorders or differences in early childhood. The present study investigates whether the presence of anomalies, alone or combined with a history of obstetrical complications or a family history of learning and/or behavior disorders, indicate those children at risk of developing language differences or behavior disorders.

The significance of this study is that it will provide evidence as to the usefulness of a screening device for the early identification of children who are at risk of becoming behavior disordered or language different. The ease of detection of minor anomalies, their identifiability at birth, and their stability across time make the measurement of minor physical anomalies a relatively inexpensive and efficient screening technique. If the results of this investigation support a

significant relationship between multiple anomalies and performance variables, early detection of those children at risk of developmental deviations will be facilitated and appropriate early intervention may become more widespread.

CHAPTER II

REVIEW OF THE LITERATURE AS IT RELATES TO THE EARLY IDENTIFICATION OF AT RISK CHILDREN

This chapter includes a review of the literature germane to the need for early identification of children who are at risk of developmental disorders. Specific emphasis is placed on the literature concerning early identification of children who are at risk of language differences or behavior disorders. It was the intent of the present investigator to review the empirical data relevant to determining the value of and procedures for early identification of at risk children. An exhaustive literature review, however, revealed that there is limited empirical data supporting and describing early screening and intervention of children with behavior disorders and language differences. Yet, it was noted that early identification and intervention are nevertheless well accepted clinical practices supported by substantial tradition among professionals providing services to exceptional children.

First, this chapter considers the opinions of experts in a variety of professions who voice the need for early identification of children at risk of developmental differences and disorders. Second, it reviews recent investigations studying the relationship between the frequency of minor physical anomalies and behavior and learning disorders. Third, this chapter discusses selected studies and opinions concerning behavior pertinent to the issues of the present investigation. A growing multidisciplinary interest in behavior disorders of young children is reflected in the abundance of literature on

that subject. Included in this discussion are some descriptions of childhood behavior disorders, a discussion of the difficulties in defining and measuring the behavior of young children, reference to some available behavior assessment instruments, and a survey of the various opinions concerning the etiology of behavior disorders. Also included is a discussion of several longstanding investigations of childhood behavior and several recent studies investigating the relationship of behavior and learning disorders.

Finally, this chapter presents theories and empirical findings concerning normal and different language development. This latter section reviews the literature reflecting the difficulties in defining, measuring, and identifying language differences in young children as well as studies and opinions concerning the impact and some possible causes of language differences. The chapter concludes with a brief description of language assessment instruments and language training programs appropriate for preschool children.

Need for Early Identification of At Risk Children

The present study represents an effort to establish the effectiveness of a particular screening procedure for identifying children who are at risk of developmental disorders. A belief in the importance of early identification underlines this study. The need for the identification of young children at risk of experiencing developmental problems has been evident in such disciplines as pediatrics, neurology, psychology, and education. Expressions of concern and statements advocating

the need for early identification have been made by scholars in many fields. Such expressions of concern, however, are not supported by stable empirical findings. Those "findings that do exist are often based upon research methods that generate more questions than they answer" (Germezy, 1975, p. 177).

Recent research in the biomedical and behavioral sciences has shown that the processes of intellectual and physical development proceed with great rapidity during the first few years of life. Although the child is highly susceptible to developmental disorders during these early years, society's capacity for identifying and treating them is at its weakest during this period (Gettings & Mayeda, 1970). Dubnoff (1970) concurs in this observation by stating that "In more than 22 years of work with learning and behaviorally disabled children, I have found that the one factor which has appeared to be of central importance, but which seemed very elusive, was the question of early detection and early remediation.... It is now generally accepted that learning patterns are set by two years of age and cognitive patterns by age four. How can we afford to waste these precious years?"

In response to the public demand for effective services to preschool exceptional children, Congress, in 1975, enacted Public Law 94-142 (the Education for all Handicapped Children Act of 1975). This Act mandates that each state must develop a plan by Fall, 1978 for identifying, locating, and evaluating all children from ages 3 to 18 who have a handicapping condition.

Historically, identification of special needs has not occurred until a child attends school. Many instruments designed specifically for screening kindergarten children for potential school problems have been developed in the past few years (Hagen, DeVito, Kreiger, and Scully, 1976; May, Silver, Magiocca, Renaldi, Crew, and Kunzelmann, 1977). Because recent research has shown that developments during the first three years of life may be of critical importance (Hunt, 1961; Piaget, 1968; White, 1976), identifying developmental disorders during infancy appears to be an essential priority.

Because early detection of developmental disorders is often a "cornerstone to the prevention of more serious and complex future problems for the child" ... [C]omprehensive screening in infancy must become a mandatory activity" (Magrab, 1976, p. 7). Tjossem (1976) has identified three categories of vulnerable, or at risk, infants. They are:

> (1) infants manifesting early appearing aberrant development related to diagnosed medical disorders with established risk for delayed development; (2) infants at environmental risk consequent to depriving life experiences; and (3) infants at biological risk 1/ as determined by increased

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1/ If the incidence of minor physical anomalies at birth is found to be an indicator of at risk children, then those children would be classified within the third group:

> Biological risk specifies infants presenting a history of prenatal, perinatal, neonatal, and early development events suggestive of biological insult(s) to the developing central nervous system and which, either singly or collectively, increase the probability of later appearing aberrant development. Early diagnosis of enduring developmental fault is often difficult and inconclusive in these biologically vulnerable infants who, most often, require close surveillance and modified care during the early developmental years. (Tjossem, 1976, p. 5)

> probability for delayed or aberrant development consequent to biological insult(s). (p. 4)

Another way of categorizing those infants and children who are vulnerable to later developmental disorders is that used by the State of Minnesota. Minnesota distinquishes between at risk and high risk children. Minnesota considers to be at risk those children for whom it can be predicted, with 75% accuracy on the basis of research evidence, that an educational handicap will be present at elementary grade level under ordinary (non-intervention) conditions. High risk children are those cases in which characteristics of a child suggest a high degree of vulnerability to later educational failure although available evidence does not meet the 75% probability criterion defining "at risk" cases. Because few data are available concerning the predictors of early language and behavior disorders, no level of probability is suggested in the present investigation. The term more widely used in the literature, "at risk", is used in this study to indicate those children who are quite likely to have a developmental disorder.

During recent years, increasing emphasis has been given to preventive health care and to screening. Frankenburg (1975) has presented ten criteria to be considered in the selection of conditions to be screened, and the manner in which a screening program should be administered:

1. The disease or condition should be serious or potentially so.

2. Through diagnostic tests and procedures it should

be possible to diagnose the condition.

3. The prognosis should be improved if the disease or condition is detected and treated prior to the usual time of diagnosis.

4. The disease or handicapping condition should have an adequate lead time and screening time [i.e., there should be sufficient time between the occurrence of the predictor and onset of the effect of the condition so that screening will be of value].

5. The disease should be treatable or controllable.

6. The condition being screened for should be relatively prevalent.

7. Screening should not harm the individual being screened.

8. Facilities should be available to diagnose and treat the individual found to have positive findings on screening.

9. The cost of screening, diagnosis and treatment should be reasonable when weighed against the human misery and the cost of treatment after the usual time of diagnosis.

10. The public should accept screening for the disease or condition in question.

In addition, a screening program should include plans for coordinating all aspects of the detection process, from selecting the screening instrument through providing treatment. Camp (1975) stresses the importance of establishing the nature and type of available follow-up before a screening program is launched. This position has been supported by Magrab (1976), who states

that only tentative predictions of future functioning can be made during infancy and therefore "early diagnosis must be for the purpose of early treatment, not for the purpose of labeling a child" (p. 7).

The current status of early intervention has been reviewed in several recent books, including: Early Childhood Education for Exceptional Children (Jordan, Hayden, Karnes, and Wood, 1977), The Application of Child Development Research to Exceptional Children (Gallagher, 1975), Planning Programs for Early Education of the Handicapped (Ellis, Cross, and Goin, 1977), Infant Education (Caldwell and Stedman, 1977), and Intervention Strategies for High Risk Infants and Young Children (Tjossem, 1976). These publications are full of hope, expert opinions, good intentions, and, sometimes, how-to-do-it program descriptions. Discussion of the results of intervention, however, are often vague. They are seldom based on substantive evaluation data; yet, all authors agree that early attention to developmental disorders is advisable.

A recently edited volume (Clarke and Clarke, 1976) presents studies which refute the view that adverse experiences during the first few years of life are of vital long term importance. Investigation of children who have recovered from the effects of early institutionalization (Dennis, 1973; Skeels, 1966), early maternal deprivation or separation (Bowlby, Ainsworth, Boston and Rosenbluth, 1956; Rutter, 1971), and early neglect and/or abuse (Kadushin, 1970) are discussed by Clarke and Clarke to support their assertion concerning early experience.

The Clarkes (1976) also refute the belief that early experiences exercise a disproportionate influence on later development. They argue that scholars and researchers during the last two decades have provided voluminous additions to developmental theory. They interpret these ideas and data to support the position that, since the child is an active participant in his development throughout his lifetime, early experience should not be viewed as more important than later experiences.

Others in the field of early childhood development share the Clarkes' view that, although early intervention may be beneficial, a child can neither learn more or more efficiently during his or her first few years of life as a direct result of early intervention (Wynne, 1975). Zigler (1975) supports the belief that "the first few years of life do not represent some magic period during which a child can be innoculated against any and all negative experiences to follow". McCall (1973) posits that, although people are much more adaptable and plastic throughout their life span than has been supposed, the early years of life provide the optimal period for developing and learning many skills.

The importance of early experiences is also advocated by Stroufe (1977) "because subsequent issues are faced within the context of previous experience and because earlier patterns represent prototypes for later behavior" (p. 879). Although these patterns are subject to change as the organism actively adapts to his experiences, there is a propensity for them to persist. Stroufe summarizes his position by stating: "The

view that early experience is of fundamental importance remains a very reasonable assumption... Neither the established fact that later experience is important nor the requirement that environment be relatively stable for the manifestation of continuity trivialize the importance of early experience" (p. 880).

Hayden (1977) has enumerated many reasons for early intervention. The following were selected from her list:

-- Early experience does have an influence, and that influence affects all areas of functioning.

-- Research has shown that there may be critical periods for the development of certain skills, and that most of these periods may occur during the first three years of life.

-- All systems of an organism are interrelated in a dynamic way; failure to remediate one handicap may multiply its effects in other developmental areas, and may produce other handicaps (particularly social and emotional ones) that are secondary to the initial insult.

-- Early intervention has been shown to help: it can work to reduce the effects of a handicapping condition, and can do so more surely and rapidly than later intervention.

-- The cost-benefit ratio of early intervention usually makes it more economical than later intervention.

-- Parents need support during early weeks and months, before patterns of parenting become established.

-- Parents need models of good parenting behavior with a handicapped child, and specific instructions for working with the child.

Ackerman and Moore (1976) take a representative position held by professionals who are concerned with young at risk children when they state "one may assume the value of preschool intervention ... this assumption will, probably, prove true if adequate measures are ever found to evaluate it" (p. 669).

When Bronfenbrenner (1973) reviewed some of the prominent preschool intervention programs in 1973, he concluded that, although such programs were lacking in sophistication and were vulnerable to failure, some were successful in producing developmental gains in the served children. Government funding of Head Start programs in the mid-1960's was a major stimulus to the development of many of the preschool intervention programs. Disadvantaged children were the benefactors of most of these intervention programs, although some emphasis was given to handicapped children.

Most of the information concerning the effectiveness of early intervention comes from evaluations of programs aimed at ameliorating the destructive effects of poverty on the development of young children (Garber, 1977; Gray and Klaus, 1970; Honig, 1977; Horowitz and Paden, 1973; Weikart, 1970). Cumulative and sustained positive effects have been observed when intervention has been initiated early in life and continued throughout the preschool years with disadvantaged children and their families. The question which has not been demonstrated scientifically, however, is whether this approach is applicable to children who are at risk of developmental disability from causes other than environmental ones. This question can be answered only when screening and programming for at risk infants and children are available and empirical results obtained.

No longer are public preschool programs only for the disadvantaged. No longer does our formal education program begin with kindergarten attendance. Education for preschool

children, both normal and handicapped, has become more widely available. Programming for infancy is the next step.

As is evident from this discussion, the literature concerning the need for and value of early identification of children at risk for developmental disorders is long on opinion and short on empirical data. The results of research projects currently in process, including this study, will add to the data base concerning our ability to identify at risk children and the value of early screening and subsequent treatment for those identified as at risk for developmental disorder. Early detection of existing or potential developmental differences in language and disorders in behavior will facilitate the planning of appropriate intervention programs which can affect indentified childrens' cognitive development, family dynamics, and social skills.

Minor Physical Anomalies Research

In order to determine which factors are important in the early identification of children who may later have developmental disorders, all possible relationships must be examined. There has been a growing interest within medical genetics and pediatrics in the relationship between congenital anomalies which are identifiable at birth and other developmental deviations, particularly those of the central nervous system. These anomalies are formed during the first trimester of fetal development and are most commonly observed in children with Downs Syndrome as well as trisomy 13 and Seckel's syndrome (Smith, 1970). Studies over the past two decades of minor physical

anomalies (MPAs) are of great interest to investigators of behavioral development. Anomalies are defined as characteristics which are neither medically nor cosmetically significant to the individual. Such characteristics are, therefore, easily overlooked. These anomalies may represent a valuable clue to the occurrence of altered embryonic development, particularly minor developmental defects of the central nervous system (Rapoport and Quinn, 1975) which, in turn, may result in genetically determined developmental disorders.

In a screening survey of 4,412 newborns, Martin, Smith, and McDonald (1964) used a list of anomalies of hands, head, feet, and trunk. They found that 14.7% of their sample had at least one anomaly and that the presence of three or more MPAs in an infant greatly increased the likelihood of a major anomaly. The significance of this study is its finding that no single anomaly appeared critical for inferring other developmental disorders in the infants. Rather, it was the number of anomalies which was important. Subsequent studies have corroborated this finding. 1/

Early associations of antisocial and criminal tendencies with congenital anomalies were investigated as early as 1915 by Healy. Goldfarb and Botstein (1956) adapted a list of anomalies to examine schizophrenic children. Durfee (1974) recently reported a higher frequency of asymetrically placed ear canals in retarded, learning disabled and delinquent children compared

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1/ Firestone, Lewy, and Douglas, 1976; Rapoport, Quinn, Bradbard, Riddle, and Brooks, 1974).

with a control population. These studies, however, lacked systematic scoring of anomalies, adequate controls, and consistent behavior measures. They shared a clinical impression that children with learning and behavior disorders have a higher incidence of anomalies. These findings are in agreement with later studies which used more valid and reliable research methods.

In 1968, Waldrop, Pedersen, and Bell utilized the list of anomalies adapted by Goldfarb and Botstein and assigned scoring weights to the anomalies which Goldfarb had found distinguished his normal and schizophrenic populations. They systematically defined the anomalies to ensure a continuum of scores within their "normal" population. An interrater reliability of .70 was obtained between observers for number of anomalies and weighted anomaly score. In two samples of normal preschool children the presence of the minor anomalies was significantly associated with hyperkinetic, aggressive and intractable behavior (Waldrop et al., 1968).

Since that time, Waldrop and associates have carried out a series of studies which utilize their standarized scoring system (See Appendix A) and systematic behavioral evaluations. Waldrop and Goering (1972) examined children selected from an elementary school with a total population of 775 pupils. Teachers selected the three most hyperactive children and three who presented no difficulty. Anomaly scoring was carried out by raters who were blind as to which group the children were in. The 34 hyperactive males had significantly higher anomaly scores

than did the 18 non-hyperactive males (scores did not differ significantly between hyperactive and non-hyperactive females). Furthermore, the number and weighted score correlated significantly with rank ordering of hyperactivity as rated by the school principal ($r = .39$ $p < .05$).

Waldrop and Halverson (1971) have conducted a newborn screening and have established the stability of anomaly scores between birth and elementary school age. Correlations between newborn and preschool anomaly scores are .70 for both males and females, and stability from birth to seven years has been demonstrated. In their replication studies, Waldrop and Halverson (1971) found males with higher anomaly scores to be consistently more impulsive and aggressive. However, this has not been consistent with female samples.

In a recent study, Halverson and Victor (1975) examined 100 elementary school children randomly selected from the rolls of a middle-class suburban school. MPAs were scored, utilizing the Waldrop scoring system and the children were ranked by teachers on hyperactive and shy behaviors. The Peterson Quay Checklist (Quay and Quay, 1965) was completed for each child. Two factors from behavior ratings, "distractibility" and "tendency to become easily frustrated", correlated significantly with frequency of anomalies for males. Peer ratings of "rowdy" and "unathletic" also were related to anomaly scores. For females, the total "behavior problem" score had a low but significant ($p < .05$) correlation with anomalies. Individual ratings of "mean" and "don't want to sit by" correlated most

significantly with the girls' MPA scores. The most recent of Waldrop's research substantiates the hypothesis that the presence of multiple minor physical anomalies was significantly related to inhibited, fearful, socially ill at ease behavior in elementary school girls (Waldrop et al., 1976).

Rosenberg and Weller (1973) assessed 99 first grade children from a suburban public school, using the Waldrop scoring system. A highly significant relationship ($p < .001$) was found between the number of anomalies and the likelihood that a child would be recommended to spend a second year in grade one.

The presence of five or more minor physical anomalies in nine of 15 children who repeated first grade is highly indicative of a relationship between anomalies and language or learning problems (Rosenberg and Weller, 1973). This finding was based on performance on The Peabody Picture Vocabulary Test, a test which purportedly measures language ability but which involves only one aspect of the complex symbolic capability required for language.

In a recent study of 81 elementary school boys referred to a hyperactivity clinic for a large outpatient drug study (Rapoport et al., 1974), a significant correlation was found between weighted anomaly score and severity of hyperactivity. Similarly, Firestone, Lewy, and Douglas (1976), utilizing a "blind" rater, found a significantly higher mean weighted anomaly score for 24 hyperactive children compared with 24 non-hyperactive controls, although they did not obtain a significant correlation between anomaly score and the teacher's rating of hyperactivity.

A screening study of 108 boys from four different populations - normal, neurotic, learning disabled, and severely disturbed - were examined for minor physical anomalies using the Waldrop system (Steg and Rapoport, 1975). This study showed a pattern among boys with multiple anomalies having a history of prenatal insults or paternal psychopathology. Both the learning disabled and the residential treatment populations had higher mean anomaly scores than did the other two groups, with no significant difference from each other. No significant relationship was found between anomaly score and IQ, EEG, or the neurological evaluation. These results suggest that the development of these anomalies may parallel early developmental deviation of the central nervous system.

Because the question of whether children with high anomalies were considered "funny looking" or unattractive was raised, full-face color photographs were obtained for 76 of the boys and were rated for attractiveness. While ratings of unattractiveness between two observers were surprisingly high ($r = .72$), there was no significant relation of this rating to weighted anomaly score ($r = .01$) (Rapoport and Quinn, 1975).

Rapoport and Quinn (1976) believe that they have identified a distinct subgroup within the population of children being treated at a hyperactivity clinic. This subgroup is characterized by the early onset (before age three years) of such difficulties as head banging and fussiness in infancy and having either a maternal history of obstetrical difficulties or a paternal history of hyperactivity. This finding suggests

a "genetic disorder which may be, and frequently is, phenocopied by trauma early in fetal development" (p. 282).

Similarly, the findings of a prospective study of 116 one-year old children (50 of whom are the sample for the present investigation) by Quinn and associates suggest that the subgroup of children with both a high anomaly score and either a maternal history of obstetrical and pregnancy complications or a familial history of hyperactivity "may be identified early in life as being at risk of development of irritability and/or hyperactivity at one year and possibly problem behaviors in later childhood" (Quinn, Renfield, Burg, and Rapoport, 1977, p. 668).

The presence of minor physical anomalies, alone or in combination with other background variables may be an indication of children who are at risk of developmental disorders in early childhood. The present study is an attempt to add to our knowledge concerning the relationship between frequency of minor physical anomalies in newborns and developmental variables at two-years of age.

Hyperactive Behavior Disorders

The literature pertaining to minor physical anomalies principally is concerned with the relationship of anomalies and hyperactive behavior disorder. The present study, however, is concerned with the relationship between anomalies and behavior disorders in general as well as hyperative behavior disorders.[1/]

1/ Therefore, the choice of the Preschool Behavior Questionnaire (Behar, 1974) which provides a rating of generalized behavior disorder, as well as three subcategories of disordered behavior, including hyperactivity, was appropriate.

This section discusses the literature concerning hyperactivity and those relevant studies which have investigated childhood behavior disorders.

It will be readily apparent from the following discussion that the definition, incidence, etiology, and treatment of hyperactivity and other childhood behavior disorders are controversial and confusing. Unlike the issue of early identification, much empirical data regarding behavior disorders are available. However, differences in definitions and assessment instruments make it very difficult to compare the conclusions of one study with another.

Description

Children with behavior disorders compose a very heterogeneous population with regard to both etiology and behavioral symptoms (Ross and Ross, 1976). This is particularly true of children identified as hyperactive. The hyperactive syndrome includes some or all of the following: poor motor coordination, distractibility, short attention span, and emotional instability, i.e., hypersensitivity and low frustration tolerance (Freiburg, 1969). Levine, Kozak, and Shaioval (1977) note that there are at least 38 descriptive terms that purport to define the same syndrome. All descriptions of hyperactivity state that this behavior disorder is characterized by a persistent pattern of excessive activity in a situation demanding a high level of compliance and orientation to a task (Ellis, Witt, Reynolds, and Sprague, 1974). The concept of hyperactivity is not a myth but rather a "specific and moderately useful diagnostic entity in an

often subjective field" (Safer and Allen, 1976, p. 24).

Difficulty in Defining, Identifying, and Measuring Behavior Disorders

Knowledge concerning hyperactivity and other behavior disorders during infancy and early childhood is very limited. Descriptions of hyperactive behavior based predominantly on clinical impressions of young children have been offered by Wender (1971). Stewart, Pitts, Craig, and Dierut (1966) have utilized parental questioning to determine that hyperactive symptoms are evident as early as infancy. Richman and Graham (1971), however, decry the fact that clinical assessments in preschool children have relied largely on the unstructured clinical interview as a means of obtaining information about hyperactivity rather than on standardized rating scales or interviews.

Recent research (Richman, Stevenson, and Graham, 1975) suggests that the rate of behavior disorders in the preschool period is very similar to that in later childhood and early adolescence. Richman and associates found that 7% of the children in their study of three-year old subjects had a behavior disorder which was moderate or severe while an additional 15% had mild behavior problems. Preschool boys were significantly more likely to be hyperactive, a finding in agreement with other studies of older hyperactive children (Werry and Quay, 1971).

The problem of accurately diagnosing the hyperactive behavior disordered child is more difficult at the preschool than at the elementary school level. Young children characteristically

exhibit a higher activity level than do older children and their "hyperactivity" may be temporary, disappearing as a function of maturity or when the child enters school (Schleifer, Weiss, Cohen, Elman, Cvejic, and Kruger, 1975).

Many behavior disorders of young children are transient, perhaps representing reactions to environmental stress. Such behavior disorders may resolve themselves with or without intervention services. Children identified as behavior disordered should be adequately evaluated to determine whether the "disorder" is related to typical stage related behavior, is of recent origin, or is isolated to a single activity such as sleeping or eating.

Chamberlin (1974) conducted a longitudinal study to ascertain the types of behavior problems which are common to preschool children. To accomplish his goal, the parents of a group of 200 children were asked to describe their child's behavior on a structured checklist near the child's second, third, and fourth birthdays. Home interviews, conducted when the children were two and four years of age, supplemented the checklist data. Parental reports showed that 47% of the parents of two-year old children identified at least one area of concern about their child's behavior. Similar figures were found at age four years.

Disorders in behavior are prevalent throughout childhood for many children. Macfarlane and associates (1954) undertook a longitudinal study of normal children in an attempt to identify behavior problems by age and sex. Among the behavior

problems of children at 21 months of age were restless sleep, food finickiness, thumbsucking, specific fears, and tempers. These behaviors were identified by mothers in a structured interview. "Overactivity" was identified as a behavior disorder shown by at least one-third of both boys and girls from ages three to years and for boys at ages seven to nine years.

Wender (1971) states that the hyperactivity syndrome, which he believes is the result of minimal brain dysfunction, is a set of characteristics exhibited from birth onwards. Wender further states that hyperactivity is evidenced by different patterns during each of the distinct stages of maturation. Schleifer's (1975) investigations, however, suggest that pre-school hyperactivity varies in its manifestations and pervasiveness from one situation to another.

Conners (1975) has addressed the question of whether hyperactivity may appear in some situations but not in others. Evidence from his research supports a theory of "situational stress response". Connors suggests that, in addition to varying teacher or parental levels of tolerance for disordered behavior, three situational elements may account for differences in behavior: excess social aggregation or stimulation, increased cognitive demands, and required degree of structure and extent to which lapses in attention penalize the child. Only the collection of follow-up data on all preschool children identified as hyperactive, however, will enable researchers to determine how many children go on to become "hyperactive children" in their elementary school years.

Prevalence of Behavior Disorders

As a result of changing definitions of behavioral disorders, determinations of the prevalence of such disorders vary with age, situation, and the period during which the study occurred. Richman and Graham (1971), however, believe that there are criteria which can be used to distinguish problematic from non-problematic behavior (Richman and Graham, 1971). According to Anthony (1970), though, the difference between normal and abnormal often amounts to little more than a value judgment or an accident of referral procedure. Many of the problems for which parents seek the help of pediatricians and guidance clinics are found in abundance among normal children (Lapouse and Monk, 1958). Lapouse and Monk (1958) have estimated that 50% of all children between six and twelve years are described by their mothers as highly active although their activity is not necessarily a problem.

A less skeptical view of behavioral disorders, however, holds that distinctions can be drawn between what is normal and appropriate behavior in a particular culture and environment and what is not. In this view, hyperactive behavior can be differentiated from normal behavior by its greater intensity, frequency, and persistence as well as by the fact that it is experienced by most observers as "different" (Anthony, 1970).

Miller, Hempe, Barrett, and Noble (1971) found that, while the average child demonstrates a few signs of each type of disordered behavior, seldom is the behavior severe enough to be classified as a specific behavior disorder such as anxiety

or hyperactivity. They also noted that, except for learning disorders, parents report equal amounts of deviant behavior in boys and girls. Miller and his collegues suggest that the higher rate of treatment referrals for boys results from the fact that boys' behavior problems are seen as more extreme and that their behavior problems are frequently associated with learning disabilities.

Hyperactive children are estimated to compose 4% to 10% of the elementary school population (Minde, 1971; Stewart, Pitts, Craig and Dieruf, 1966; Wender, 1971). Monrad (1971), in a recent study of hyperactivity, suggests that the high incidence of hyperactivity among American children may result in a population of as large as 3.5 million. Although hyperactive children constitute a small part of the usual preschool and elementary school class, their effects on peers and demands on teachers are far out of proportion to their numbers (Bell et al., 1972).

Teachers' perceptions of the behavior of their students in grades kindergarten through 12 were recently surveyed by Kelly, Bullock, and Dykes (1977). More than 2,000 teachers rated 20% of their students as behavior disordered, with 12.6% placed in the mild category; 5.6% were considered as having moderate disorders, and 2.2% were rated as having severe behavioral disorders.

Although all children have some temporary behavior problems at one time or another, the task of primary health care providers, educators, and related professionals is the prompt and accurate identification, evaluation, and remediation of

significant behavior problems. Richmand and Graham (1971) have stated that we need to establish: the numbers of children with behavior problems and the special facilities they might require, (e.g., in nursery schools or play groups); which disorders are likely to clear up spontaneously; and what measures are effective in dealing with those that persist.

Baker and Dreger (1977) suggest that a majority of young children with serious behavior problems are not referred for evaluation and treatment until the problems have been evident for extended periods of time and it is obvious that they are not going to be outgrown, as pediatricians often encourage parents to think will occur. Since many parents do not spontaneously discuss the behavior disorders they observe (or suspect) in their child, Chamberlin (1974) suggests that pediatricians and other child specialists need to employ a more specific screening procedure to identify young children evidencing behavior disorders.

Etiology of Hyperactivity and Other Behavior Disorders

The causative factors underlying hyperactivity and other behavior disorders continues to be a subject of speculation. Hyperactive behavior has been variously explained as being the result of an inborn temperamental difference in the child (Chess, Thomas, Rutter, and Birch, 1963), a chemical imbalance, an emotional problem (Levine, Kozak, and Shaoiva, 1977; Millichap, Aymat, Sturgis, Larson, and Egan, 1968), minimal brain damage, dysfunction, or injury (Wender, 1971), environmental quality (Chess et al.,1963), family stress, and chromosomal disorders

(Crandall, Carrel, and Sparkes, 1972). Another explanation which has gained support during the past decade is that hyperactivity is the result of biochemical agents and nutritional deprivation (Feingold, 1975).

The relative importance of adverse prenatal and perinatal factors affecting later behavior development and learning was studied by Lievens (1974) and by Pasamanick and assocates (Pasamanick and Knobloch, 1961; Pasamanick, Rogers, and Lillienfeld, 1956). They found that the mothers of hyperactive, confused, and disorganized children showed significantly more complications during pregnancy and that the perinatal complications for hyperactive children were greater than for their matched controls. Graham (1962), however, has presented data which refutes this conclusion. Graham found that identification of prenatal and perinatal "high risk" events has only weak ability to predict infant or preschool development. Graham's research indicated that the difference between high risk infants who have experienced fetal anoxia and control groups decreased over time so that discrepancies virtually disappeared by school age (Graham, 1962).

The belief that brain injury early in life has a direct causal relationship to later behavior, including hyperactivity, has been commonly expressed for many years (Hebb, 1942; Wender, 1971). Isaacson (1976) reports that damage to the infant brain produces greater disorders in development and behavior than damage to a mature brain. However, he has found that recovery is a realistic possibility determined by the unique emotional and experiencial components of the individual.

Conners' (1975) has noted that the theory that hyperactivity is the result of minimal brain dysfunction (MBD) is both one of the most widely used and most disputed concepts in the field of medical psychology of children. Yet, Connors points out:

> Although a fairly high percentage of hyperactive children show various signs of neurological involvement, including abnormal coordination or perception, EEG abnormalities, neurologic soft-signs, pre- or perinatal trauma, disorders of vegetative functions or of major developmental tasks, these characteristics have not shown high associations whenever research has started by sampling these abnormalities, and then trying to find the degree of presence or absence of associated hyperactivity. (Connors, 1975, p. 138-139)

It is because of these contradictions, Connors states , that many researchers have come to view hyperactive behavior as "a multi-dimensional disorder, with a variety of distinctive etiologies, only some of which are organic" (p. 139).

Connors suggests that viewing children's behavior disorders in terms of brain dysfunction has changed the focus of treatment methods and research. Specifically, he states:

> At any one point in time such a concept as MBD may be found to be wanting in terms of empirical justification or conceptual clarity, but its use has a powerful social impetus in redirecting the energy and resources expended in the research for understanding of basic mechanisms and new forms of therapy. Whether such a redirection is ultimately successful in the production of new knowledge, or has a pernicious effect in distracting one from more socially relevant variables, the fact of the MBD concept as a heuristic force seems undeniable, and is perhaps its best raison d'etre. (p. 160)

Two investigations which tested genetic influence on behavior are reported by DeFries and Plomin (1978). Subjects of

the two studies included 109 hyperactive children reared by their natural parents, 74 hyperactive children reared by adoptive parents, and a control population of 91 nonhyperactive children reared by their natural parents. Family histories of childhood hyperactivity were collected in retrospective parental interviews. Reports indicated that there was significantly more childhood hyperactivity among children reared by the natural parents than among children reared by adoptive parents. DeFries and Plomin believe that this finding supports a genetic hypothesis and indicates that the "rearing environment may not be important in the development of hyperactivity" (p. 491).

As is evident from the foregoing discussion, there are a multitude of possible causes of and labels for behavior disorders. In some instances, labels reflect a philosophical stance. Eisenberg (1978) points out that relabeling "minimal brain dysfunction" as an emotional problem betrays an either/or view of the nature-nurture dispute. Based on his clinical experience, Eisenberg suggests that:

> Whether we call the intrinsic factor "temperament," "developmental lag," or even "cerebral dysfunction," it seems clear that some predispositions intrinsic to the child interact with particular features of the social environment to give rise to the deviant behavior that makes a given child a patient and not the sibings (p. 320).

Attempts to determine which factors in young children are reliable predictors of later problems have been unsuccessful. No combination of variables have been identified to increase the accuracy of identification. It appears that reliance on child

characteristics alone as possible predictors may not be successful because they ignore the significant influence of the setting in which the disorder is observed. According to Chamberlin (1977) behavior disorders should not be considered a "trait" residing in a child, but rather the result of the interaction of the child and the environment. As is apparent from the foregoing discussion, the etiology of behavior disorders, including hyperactivity, is an unresolved issue.

Behavior Screening Instruments

Identifying and measuring the behavior disorders of young children is complicated by the limited number of instruments standardized for use with preschool children. Baker and Dreger (1977) identify this as a problem in their clinical practice:

> Preschool children referred to clinics have posed problems for diagnosticians because of the relative lack of instruments for assessing temperament and measuring behavior in this age group. This lack is especially evident for the child who has a speech problem or who is non-verbal, over-or hyperactive, or distractible otherwise (p. 241-242).

Efforts to define a valid measure of hyperactivity at the preschool age level have included rating systems to be used by teachers (Bell, Waldrop and Weller, 1972), clinical observations (Schleifer et al., 1975), and playroom observations (Rapoport, Abramson, Alexander, and Lott, 1971). A listing and description of over 200 instruments designed to measure behavior disorders of preschool children is contained in Socioemotional Measures for Preschool and Primary Children (Walker, 1973) and Tests and Measurements in Child Development: A Handbook (Johnson and

Bommanto, 1971). The Psychopharmocology Bulletin (1973) discusses a number of instruments appropriate to the study of children with behavior disorders. 1/

Early Longitudinal Studies Investigating Behavior Disorders of Children

Several investigations of possible infant predictors of later behavior have looked for precursors of hyperactivity. The Fels Research Institute Study (Kagan and Moss, 1962) found that hyperactive behavior as described by parents was stable from age three years to fourteen years for both sexes. Specifically, they noted that the boys who were hyperactive during the early childhood years (three to six) were least likely to exhibit adult dependency on a love object. Boys who had hyperactive behavior during the ages six to fourteen were, as adults, sexually active, competitive, and not highly involved in intellectual pursuits.

A recent reexamination (Battle and Lacey, 1972) of the motor activity data of 74 subjects from the Fels Longitudinal Study led to the following conclusions concerning males who had been identified as hyperactive:

1. Motor hyperactivity is relatively stable for the contiguous age periods 0-3, 3-6, and 6-10.

2. During each childhood period, these hyperactive males showed less evidence of general achievement striving and, during the first two age periods, a particular lack of approach toward intellectual tasks.

1/ All instruments described in these volumes were reviewed by the present investigator before the Preschool Behavior Questionnaire was selected for use in this study.

3. The hyperactive boys showed early and continued evidence of physical boldness and even physical achievement effort, in contrast to their intellectual withdrawal.

4. During the first two age periods, there was a lack of compliance toward adults on the part of these boys which was augmented by various efforts to gain attention and to dominate them in the 3-6- and 6-10-year age periods.

5. During the preschool and elementary school periods, hyperactive males showed the physical aggression documented by other observers and, in addition, attempted to seek attention from and to dominate their peers.

6. During the earliest years, mothers of hyperactive boys were critical, disapproving, and severe in their imposition of penalties for disobedience; lacking in affection, protectiveness, and babying; and characterized by a low intensity of interaction with their sons.

7. Although hyperactivity and IQ levels showed no significant relationship to each other, hyperactive 3-6-year olds were rated by their mothers to possess lower levels of intelligence during the grade school years. Boys who were hyperactive in infancy estimated their intelligence to be low during adolescense and 3-6-year-old hyperactive males expressed anxiety about their intellectual competence in adulthood (p. 767).

Battle and Lacey draw the following conclusions concerning female Fels subjects:

1. The motor hyperactivity scores of girls fluctuated from one childhood age period to the next throughout the childhood years.

2. The 3-6-year age period was a critical one, when considering the impact of motor hyperactivity on other aspects of the life situation observed.

3. Hyperactive girls were physically bold and socially aggressive during the 3-6-year period, as were their male peers.

4. In contrast to their male counterparts, hyperactive 3-6-year-old girls demonstrated significantly greater achievement approach efforts in

childhood and a high estimate of their own intelligence in adolescence.

5. While the hyperactivity of males was consistently associated with (negative) reactions on the mothers' part, there were few significant maternal correlates of hyperactivity among females.

The Berkeley Growth Study (Schaefer and Bayley, 1963) followed children from 10 months of age through adolescence, periodically rating their responsiveness to persons, activity level, speed of movements, degree of responsiveness, amount of positive behavior, irritability, and emotional tone. In general, no evidence was found to support the predictive abilities of early behavior ratings. However, infancy ratings by parents of "rapid" and "active" behavior were negatively correlated with such positive task-oriented behaviors as being cooperative, interested, attentive, systematic, and exertion of effort in early (boys only) and late childhood.

Some of the above findings were refuted by the New York Longitudinal Study (Rutter, Birch, Thomas, and Chess, 1964), which noted that behavior ratings during the first year of life had no predictive value in relation to the child's development during the school years. Significant differences were apparent only by the second year, when temperamental characteristics became associated significantly with developmental disorders.

Some Recent Studies Investigating Hyperactivity

The studies discussed in this section are recent investigations of hyperactive behavior as it relates to and interferes

with learning. 1/

In addition to being disruptive of the classroom milieu and the home, hyperactive behavior often is associated with learning disabilities. Some children with remarkably high energy and activity levels are superior learners and high achievers. Often, however, the hyperactive child's impetuous, fidgity, and noisy behavior is associated with serious learning problems which puzzle teachers and remedial specialists alike.

In reporting their treatment of 30 hyperactive children, Ambrosino and Del Fonte (1973) state: "Although none of the children had been referred for their learning difficulties, almost all of them required remediation". Minde and colleagues (Minde, Lewin, Weiss, Lavigueur, Douglas, and Sykes, 1971) support this observation, reporting that hyperactive children have uneven cognitive patterns and numerous verbal difficulties which further interfere with their learning and academic success.

A brochure designed for the parents of hyperactive children (Minde, 1971) states that about 25% of hyperactive children have specific learning difficulties and about 70% fail one or more grades before reaching the fifth grade. Although hyperactive children often have average or above average intelligence, learning deficits are not uncommon (Blunder, Spring, and Greenberg, 1974; Evans and Smith, 1977).

1/ The terms learning disability and specific language disability or disorder are used to identify students who are evidencing educational difficulties in the secondary language skills of reading, writing, and spelling.

Freibergs and Douglas (1969) found that hyperactive children are particularly dependent on external feedback and/or reinforcement. When continuous reinforcement was provided to the hyperactive students in a controlled learning situation, they accomplished concept learning as well as the (normal) control students.

However, Hemry (1973) found that the performance of impulsive children was not improved as a result of material reinforcement or verbal reward. He suggests that these children should be guided to learn a more efficient means of problem solving (appropriate to their own response style) to improve their functioning in learning situations.

It has long been assumed that the most desirable environment for hyperactive children is a highly structured self-contained classroom (Cruickshank, 1967; Strauss and Lehtinen, 1947). Psychologists, pediatricians, and special educators often recommend small, specially programmed classrooms with reduced stimuli for the behavior problemed child.

There is some support for this assumption although Reger (1963) suggested, over a decade ago, that the hyperactive child actually needs as much environmental stimulation as other children. According to Reger, the hyperactive child also needs guidance to improve his or her ability to deal appropriately with surrounding influences. Recently, Zentall (1977) presented empirical support for the theory that the hyperactive child suffers from understimulation and that hyperactive behavior serves to provide the child with needed stimulating

input. Chasey (1977) also views hyperactivity as a constant search for additional stimulation. He reports that it is often the case that with increased stimulation, hyperactive children have a decreased rate of motor activity.

While Schleifer (1975) noted that hyperactive behavior diminished with a favorable teacher-child ratio (1:3) and a superior nursery school teacher, more recent research contradicts the assumption that a hyperactive child does better in a small controlled classroom environment. Flynn and Rapoport (1976) conducted a one-year study of hyperactive childrens' behavior in open and traditional classrooms. They found that teachers perceived the behavior of hyperactive children in open classes as less distinctive and disruptive than did teachers who had such children in traditional classrooms.

Follow-Up Studies of Behavior Disordered Children

Hyperactivity can exist from infancy through adulthood - not just during middle childhood. While it was earlier believed that children "outgrew" their hyperactive behavior, it now appears that, although a few hyperactive children settle down during late childhood (age 8-10 years), this is generally not the case (Safer and Allen, 1976; Eisenberg, 1978).

Several studies investigating children or adults who had been earlier identified as hyperactive have been reported. A follow-up study of 37 elementary students identified as hyperactive four to six years earlier indicates that, after the age of 12, hyperactive children may calm down. However, such children continue to exhibit behavior defects and a low

self-concept, although intelligence and gross motor skills are not affected (Minde et al., 1971). At least three different studies (Borland and Heckman, 1976; Menkes and Menkes, 1967; Robins, 1966) have studied men who had been treated for hyperactivity 20 to 25 years earlier. Each study indicated that a significant majority of the men were evaluated as unsuccessful; in one study (Borland, 1976), they had not achieved the socio-economic status equal to their brothers.

A five-year follow-up study (Weiss et al., 1971) of children treated for hyperactivity indicates that hyperactive behavior diminsihes with age although the child retains other handicaps. Specifically, 64 hyperactive children were restudied, behaviorally, educationally, and neurologically, five years later, when they were adolescents. These subjects were easily differentiated from their peers by greater aggressiveness, restlessness, and antisocial behavior as reported by parents and teachers. The investigators found that emotional immaturity, poor self-image, inability to maintain goals, and feelings of hopelessness were common among the subjects. Severe and chronic educational underachievement in spite of normal or superior intelligence as measured by the WISC was a concomitant to the behaviors noted.

It appears from these reports that hyperactivity can be detected throughout the lifespan and that children diagnosed as hyperactive often have lifelong problems. Yet, there is remarkably little empirical information available on the relationship between preschool children's behavior disorders at home and

later behavior at school. Coleman, Wolkind, and Ashley (1977) find "the lack of evidence on the prognostic implications of early childhood symptomatology for the child's adjustment to school" to be particularly unfortunate.

Coleman et al.(1977) studied the prevalence and progress of behavior symptoms of 100 children attending nursery schools in an inner London borough. The children, who were three years old at the beginning of the study, were reevaluated when they were four and five years of age. Behavior information was obtained at ages three, four, and five years through administration of the Richman and Graham (1971) parent interview. At ages four and five years, a maternal health questionnaire was included and, during the last evaluation, a questionnaire (Rutter, 1967) concerning the child's behavior in school was completed by teachers. Results of this study indicated that boys' overactivity at home and girls' separation difficulties were possibly linked with problems at school. Overall, the level of disturbance at home was found to have no prognostic significance for later school behavior. Although the belief of continuity of behavior has powerful roots, it is a concept which is not supported by the findings of Coleman and his colleagues. They suggest that discrepancies in behavior may be the result of role-playing (i.e., using social skills to play different roles in different circumstances). Because preschool children are not expected to have such highly developed social skills, many persons will find it difficult to accept the possibility that the behavior of very young children may be purposefully chosen.

Schleifer and colleagues (1975) suggest that children whose high activity is situation-specific at home be dubbed "situational" hyperactive, while the very active children can be labeled "true" hyperactive because their activity is cross situational. Campbell, Endman, and Bernfeld (1977) employed these categorical descriptions in their follow-up study of 31 preschool children who had been identified by maternal report and nursery school observation as hyperactive. Three years later, when the children were six to eight years old, they were observed in their classrooms to determine the persistance of both situational and true hyperactivity. Results indicated that early hyperactivity is predictive of later classroom behavior with the more active and aggressive true hyperactive children showing more problems than the "situational" children. The investigators (Schleifer et al., 1975) believe that because hyperactivity is stable over time, early identification and remediation may be possible. They also state that their findings suggest that there are "distinct etiological subgroups of reactive and constitutional hyperactive" (p. 248).

Summary

It is apparent that the definition, prevalence, persistence, and etiology of behavior disorders continue to be highly controversial issues. Less is known about preschool children with behavior disorders than is known about older behavior disordered children. Future longitudinal studies of young children identified as behavior disordered and their peers who have no identified problems should provide sufficient

knowledge to enable us to refine our ability to identify and treat preschool children with behavior disorders.

Language Development

The acquisition and development of language and those factors which may interfere with normal language development have been the subject of numerous theories and extensive research. It is agreed that language acquisition is a dynamic process which develops and changes throughout life. There is general agreement among scholars that, under normal psychological, physiological, and environmental circumstances, the child's early language development progresses through such preliminary forms of linguistic communication as crying, cooing, babbling, echolalia, and the production of one-word utterances, followed by two- and three-word phrases.

Our current knowledge concerning language acquisition is the result of two decades of rapidly increasing observations and theories explaining the language development process. K. E. Nelson (1977) began a recent article by stating:

> Describing language development between 2 and 20 would have been less complex either 2 or 20 years ago than it is at present (1977). Twenty years ago the process of language acqusition was so widely assumed to be a simple learning process and the actual observations on which children say and do in learning so limited that very little of excitement or depth could have been offered. In contrast, 2 years ago many investigators felt that fresh and detailed evidence had carried us to the verge of understanding how the child masters speech. (p. 384)

The study of language development during early childhood became a central topic in contemporary linguistics in the early

1960s. The initial impetus came from Chomsky's Syntactic Structures (1957). Chomsky emphasized that, in developing language, one must acquire a system of rules which makes it possible to generate an infinite variety of sentences which may never previously have been heard. He championed the view that the ability to acquire language is species specific.

Inquiry into the early acquisition of rules of grammar had primarily focused on the formal syntax of children's speech - i.e., the arrangement of words in utterances at successive stages (Braine, 1963; Brown and Frazer, 1963; Brown, Frazer, and Bellugi, 1964; Brown and Bellugi, 1965; Miller and Ervin, 1964). Each of these studies involved visits to the homes of a small number of children where several hours of language was tape-recorded at periodic intervals. These studies demonstrated that the earliest two-word utterances of young children are systematic and rule-governed. Moreover, the several investigators concurred in the nature of the rules with which they described children's syntactic constructions.

In his attempt to define the semantic relations in emerging language (i.e., early two-word utterances), Schlesinger (1971) concluded that word classes occur together in predictable positions. He proposed that these word classes specify the relations that hold between such concepts as agent-action, action-object, and agent-object. Bloom (1972) also has noted that children begin to express the basic grammatical relations (i.e., subject-verb, subject-object, and verb-object) in their early two-word utterances although subject-verb-object strings

do not occur. Although subject-verb-object strings are not produced by young children, these grammatical relationships are nevertheless postulated in the underlying structure of utterances to account for the inferred semantic interpretation of two-word utterances.

After presenting a thorough historical review of language development theories and research, Lois Bloom (1975) describes her view of the form and function of the early stages of language development. Bloom offers an explanation of children's use of single-word utterances in terms of their developing cognitive capactities. She cautions, however, against the stance that the period (in language development) which occurs between first words and the use of two- and three-word utterances is a single "developmental milestone". Complex changes in cognitive development during this period, she states, influence the child's use of language and are reflected in the child's words. The child's choice of words and the way in which they are used appear to be functions of the underlying cognitive development (Bloom and Lahey, 1978).

In order to propose rules of grammar for early language, Bloom (1973, 1975) added a systematic account of the nonlinguistic context and behavior in relations to linguistic performance to her transcriptions of child speech. Through this procedure, she found evidence that a child intends to express certain meanings with even his earliest utterances, meanings that go beyond the simple naming in succession of various aspects of a complex situation. Early language, Bloom noted, communicates

relationships between particular objects and events in the child's world. The learning of linguistic structure is dependent upon the prior development of concepts: (1) existence of the referent (nouns), (2) reoccurrence of the reference (more and noun), (3) action upon the referent (agent-action-object relationships), and (4) nonexistence (negations). Bloom concluded from her research that a "linguistic crossover" occurs between two and three-years of age as the child's syntactic abilities advance over the underlying thought. However, according to Bloom, the developmental shift from learning to talk and talking to learn is not at all clear.

After studying the language development of 18 children during their second year of life, Nelson (1973) noted that their language competence developed at different rates in lexicon growth, mean length of utterances, and in grammatical structures. She concluded that there is no one way to learn language although the components to be learned are universal. Nelson found that the child's choice of problem-solving strategies - imitation, questioning, comprehension, etc. - influences early language abilities. Strategy choice depends upon the child's point of development, cognitive style and organization, language function hypothesis, and strategies used by the mother. Ervin-Tripp (1973) offers a similar view of the influences of and prerequisites to the acqusition of language: environmental circumstances, cognitive development, and information storage.

Schlesinger (1977) recently compared the two major views of language acquisition: the cognitive determinism view

(Bloom, 1973; Piaget, 1968; Menyuk, 1976), which claims that language develops through maturation and interaction with the extralinguistic environment, and the linguistic input position (Skinner, 1957), which claims that the child's language development is determined by experience with language. Schlesinger proposes that it is the interaction of these two factors which account for language development.

The pattern and pace of language acqusition is an issue about which there is substantial ongoing debate. It appears, however, that language competence develops with time, imperfectly at first, but with increasing scope and precision (Siegel and Broen, 1976). Lee (1974) states that all children acquire language in a very similar developmental pattern. Greenfield and Smith (1976) support the view that language develops in a generally consistent, definitive order. Muma (1973) questions this belief, noting that, even where the sequence of acquisition is comparable across children, the rate of development is likely to be extremely variable. Muma describes language acquisition as occurring in spurts associated with "frequent rapid development". While Siegel and Broen (1976) postulate that children do not develop language at the same rate, or even necessarily in the same sequence, Brown (1973) states that children acquire language in an approximately invariant form although at widely varying rates.

While the course of language development appears to be similar for all children, individual differences during the preschool years are striking. Cazden and her associates (1972)

point out that "at age 2-1/2, many children are talking a great deal while others do not utter a word... A little later in life, roughly from 3-1/2 on, there is a relationship between how verbal a child is and how verbal he will be in the future. But in the earliest months of talking, this is not the case" (p. 84).

Historically, a major index of progress in language development has been the increase in sentence length (McCarthy, 1954). Brown and Bellugi (1965) strongly support this position by stating that the "best single index of the level of speech development is the average length of utterance" (p. 134).

More recently, Brown (1973) has stated:

> The mean length of utterance (MLU) is an excellent simple index of grammatical development because almost every new kind of knowledge increases length: the number of semantic roles expressed in a sentence, the addition of obligatory morphemes, coding modulations of meaning, the addition of negative forms and auxiliaries used in interrogative and negative modalities, and, of course, embedding and coordinating. All alike have the common effect on the surface form of the sentence of increasing length (p. 53-54).

According to Bloom and Lahey (1978), MLU is a convenient index of early language development. However, they caution that:

> ... it is necessary to keep in mind that even though MLU is a reasonable index for comparisons among children, it is only a gross index of language development. The use of MLU is reasonable because the length of children's utterances increases with development, up to a ceiling of about four to five words. It is only a gross index of development because it presents no information about the structure of children's sentences, and there can be important differences in relative grammatical competence among children with the same average utterance length (p. 41).

The mean length of utterance (MLU) for two-year old children has been observed by many investigators. Chart 2 depicts some relationships between MLU and age. It is obvious that there is some variation among children of the same chronological age.

CHART 2: MLU AND AGE

Number of Subjects	Age (Months)	MLU:Mean	MLU:Range	
18	24	1.91	1.03-3.37	Nelson (1973)
2*	30	2.12	1.75-2.50	Brown (1973)
4	25	2.54	2.30-2.83	Bloom and Lahey (1978)

*Brown's third subject, Eve, is reported to have had a MLU of 3.0 at twenty-four months of age.

Bellugi (1972), Brown (1973), and Tyack and Gottsleben (1974), have provided descriptions of early language development in terms of stages. Each stage is delineated by a mean utterance length which, they assert, provides a more accurate characterization of language development than age norms. Although the MLU assigned to each stage differs among these investigators, all agree that children's early language gives evidence of being "systematic, regular, and productive" (Bellugi, 1972, p. 50).

Bloom and Lahey (1978), researchers with clinical skills, present a developmental model of language acquisition which is concerned with three dimensions of language: (1) content - expression of a variety of meanings: (2) form - correct sentence construction; and (3) use - language production appropriate to a variety of social situations. Thus, a child may demonstrate abilities or disorders in knowledge of content, form, use, or

in the interrelationships between any two or among all three (Lahey and Bloom, 1977). The sequence of language acquisition is described in terms of eight phases which incorporate increasingly more advanced cognitive concepts and grammatical qualities, as well as longer utterances. It appears that the authors' purpose for developing and describing the eight sequential phases is to provide guidance to practitioners who are planning language development goals for young children with language differences.

Practical landmarks of early language development can be extrapolated from the more recently reported studies. It appears that a relatively short time elapses between the time a child begins using single-word utterances (12 months) and when he begins combining words at approximately 18 months of age (Miller and Yoder, 1972). Most professionals concerned with language development agree that a two-year old child can be expected to use two-word utterances. Striffler (1976) has observed that, at about 18 to 20 months, the normally developing child's first two-word utterance appears, marking the emergence of grammar. In addition, "at two years of age, the child typically has a vocabulary of approximately 275 words. His speech is mainly centered around himself. At this time he is beginning to use plurals, pronouns, and approximately two prepositions. The complexity of his language increases rapidly" (Striffler, 1976). Young and Schleicher (1977) suggest that a two-year old child should be clinically assessed for a possible language disorder if he or she is not naming some familiar

objects and using a few two or three-word utterances.

K.E. Nelson (1977) has summarized his perception of the impact of recent investigations of early language development by observing that four trends in thought about early language have emerged: (1) a recognition that languages may be acquired in such other modes as sign language and written form; (2) the view that cognitive processes are essential to an explanation of language learning; (3) inclusive data indicating the startling variety of individual difference among young children developing language; and (4) an interest away from early syntactical development to the functions of early language.

Language Differences

As has been previously discussed in this chapter, there is great disagreement concerning the patterns, sequence, and components of language acquisition. This lack of agreement concerning normal language development complicates the study of language differences. Because there is no clear description of what is "normal", it is most difficult to identify what is different.

Difficulty in Defining and Measuring Language Difference

Three recent volumes (McLean, Yoder, and Schiefelbusch, 1972; Schiefelbusch, 1972; and Schiefelbusch and Lloyd, 1974) have focused on the problem of describing and identifying language differences and intervention. However, by the time these books were published, research data in the areas of language acquisition and cognition had radically altered our concept of early language development and differences. As our

understanding of normal language development is expanding, so is our comprehension of language disorders.

A primary limitation of the investigations of children with language differences is the small number of subjects studied. Hence, the generalizability of these data is open to dispute. A similar limitation applies to many of the studies of normal language acquisition. A further limitation is that, unlike the many recent studies with normally developing children, most of the research investigating language differences has been done with populations of school-age children.

Investigators of the child whose language development is not like that of other children have provided a variety of labels including language delayed (Lee, 1974), disabled (Lillywhite, 1970), deficient (Aram and Nation, 1975), deviant (Leonard, 1972), and disordered (Stiffler, 1975). The definitions accompanying these labels are equally varied.

Knobloch (1976) and Stiffler (1976) suggest that children with a language disorder are deficient in one or more aspects of verbal functioning while demonstrating at least average ability in other developmental areas. Lee (1974) suggests that children who have been labeled as "language delayed" are not merely following the natural pattern of development at a slower rate but are failing to make some of the linguistic generalizations on which syntactic development depends.

Leonard (1972) cautions that the term "language delayed" is probably inappropriate in most cases because children with language differences use more transformations than do younger

normal children and that deviant language users often reach a plateau of syntactic and morphological development during their early years. He suggests that the pattern of errors may be the key to resolving the question of delay versus deviancy in language disorder:

> It may yet be possible to accurately determine at the presentence level whether or not a child will acquire standard syntactic or morphological usage, regardless of his age. I propose that such a way may be through an analysis of a child's two-word utterances....
>
> What may be an important difference between the two-word utterances of the younger normal child (as well as of the "slow developer" who may eventually develop standard language usage) and those of the deviant language user is the frequency of subject-verb utterances such as "Shoe fall". While these two-word utterances appear fairly often in the speech of young normals, they do not appear to be reliable entities in the speech of deviant language users. (Leonard, 1972, p. 441-2).

From his investigation, Leonard found that verb utterances represented 23% of the two-word utterances of two-year old normal children (N = 2) while the deviant language user's subject-verb utterances represented only 4% of his two-word utterances.

Although the language behavior of retarded (McLean, Yoder, and Schiefelbusch, 1972; Schiefelbusch, 1972) and disadvantaged (Fistoe, 1975) children has received much attention, that of children who are language different for undetermined causes has only recently begun to be described with possible developmental trends hypothesized.

Aram and Nation (1975) completed a study of the language behavior of 47 children, aged three through seven years. All of

the children were receiving therapy at the Cleveland Hearing and Speech Center. Each child was evaluated on the Peabody Picture Vocabulary Test, Assessment of Children's Language Comprehension, Northwestern Syntax Screening Test: Reception, and Templin's Picture Sound Discrimination Test. The patterns of language behavior identified in this study suggest that a hierarchy of deficits exists, i.e., if the semantic level is deficient, the two lower levels of syntactic and phonologic skills will also be deficient. Syntactic disorders also subsume phonologic problems. The results of the study also indicate that differential disorders can exist in the child's ability to comprehend, formulate, and repeat language. It appears that the population of children diagnosed language disordered is heterogeneous, exhibiting individual differences in rate, sequence, and components of language development (Aram and Nation, 1975).

Several British studies (Randall, Reynell, and Curwen, 1974; Stevenson and Richman, 1976) have chosen the following criteria for the identification of three-year old children evidencing language disorders: (1) expressive language age less than or equal to two-thirds chronological age; and (2) expressive language age less than or equal to thirty months (six months behind chronological age). The instrument used in these studies to assess expressive language was the Reynell Developmental Language Scale.

A longitudinal observation of language as it developed in normal children from 18 to 36 months was recently reported by Trantham and Pedersen (1976). Language samples of eight

children were collected at 3-week intervals and evaluated according to Lee's (1974) Developmental Sentence Analysis. In addition to this analysis, language samples were evaluated for utterance length, presence of jargon, echoing, verbal play, gesturing, sentence types, verb tense usage, and emergence and mastery of various grammatical forms during the study. One of the eight children was identified as language different because his "language was not only remarkably slow, but also different in pattern". Specifically, the developmental pattern of the language different child was the same as that of the normal study children in the following developmental areas: jargon, echoing, single words, non-verbal cues, and verbal play; concepts; reached 100 utterances; negative declarations; indefinite and the personal pronouns you, he, those; the verbs are, will, and do; conjunction "and" connecting objects; and the questions who?, what?, and where + subject + ing?.

The language of the child identifed as language different never included the following abilities: self-correcting syntactical errors; negative imperactives or interrogatives; regular or over-generalized past tense; the personal pronouns they and we; the verbs can, and am- ing; the negatives can't and don't; conjunctions connecting sentences; and the question what + subject + ing?.

The investigators (Trantham and Pedersen) provide a detailed description of the language different child's development which indicates that he had age-appropriate gross and fine motor and social skills. His intelligence was just above average

(IQ = 111) as tested by the Stanford-Binet. These data and observations indicate that the observed language differences were not a result of generalized retardation.

Several characteristics of the child's early language aroused the suspicions of the investigators (Trantham and Pedersen). While the child had overall poor intelligibility in contrast to the other seven children, he was able to articulate many words which are typically difficult for a younger child to prounce, such as lunch, trash, chair and knife, at 22 months. His spontaneous language contained random and inconsistent sound substitution, and, occasionally, a distorted word with missequenced sounds such as "oosh" for "shoe". He uttered atypical sequences of words in which he used "long strings of nouns, placed the verb before the subject, placed the object before the subject and the verb, and misplaced participles".

Menyuk (1969) analyzed the utterances of three children at ages three, four, and six years, all of whom had been described as using "infantile language". Menyuk found that after these children had acquired the use of certain structures at age three, there appeared to be little change in the language they used from age three to six. The children's language was characterized by the following: comprehensible but limited utterances; "unmarked" grammar, i.e., tense, pluralization, and case are frequently unmarked; and the use of him or me as subjects of sentences. Most of their sentences could be described as NP + V + NP (Me have this one) or NP + Neg + VP. In summarizing her early investigations of language different

children, Menyuk (1971) noted that children with a syntactic problem as well as an articulation problem behave very consistently. Her findings indicated that these children consistently treated morphological endings (pluralization and tense markers) very differently than they did word endings:

> When a final strident was part of a word (as in nose), the /z/ was either produced or substituted, but when it was a plural marker (as in shoes), it was omitted. When the final strident was part of a word (as in dress) the /s/ was either produced or substituted, but when it was a tense marker (as in makes), it was omitted. When the final /d/ was part of a word (as in friend), the /d/ was produced or substituted, but when it was a tense marker (as in named), it was omitted.... Although these children may develop deviant rules, they nevertheless develop rules. They display the human capacity to detect and store abstract features which represent generalizations about the language they hear (p. 39).

The language behavior of handicapped children identified as mentally retarded, autistic, learning disabled, etc. lags behind their normally developing peers with respect to many or all aspects of language development - semantic, syntactic, morphological, and phonological (Menyuk, 1975). With respect to the populations cited above as well as those children who are language different for undetermined causes, Menyuk suggests the possibilities that: (1) some aspects of language are not acquired at all, (2) some aspects are acquired at a later age than that of normally developing children, and (3) some aspects of language are acquired differently (Menyuk, 1975).

Identification of Early Language Differences

The investigations discussed in this chapter indicate that children vary in the pattern and pace of early semantic and

syntactic acquisition. Even though there are considerable individual differences, the wide discrepancies in the rate of development of a particular child call for further investigation.

"An undetected and untreated language disorder is not a static condition, but one which becomes self-perpetuating and increasingly complex" (Knobloch, 1976). Since communication disorders have the potential to generate further dysfunction, the language different child should have a careful professional evaluation to determine the nature and extent of the problem. Clinical experience supports the view that early identification of language differences permits early remediation.

Early delays or disorders in language development are often first brought to the attention of a pediatrician. Goffman and Allmond (1971) point out that far too often a cavalier attitude has been taken regarding a child's delay in language development or regarding suspected disorders in language, with suggestions to the parent that 'he will talk when he is ready; you are doing too much for him, so he doesn't need to talk'. Parents are often given the impression that they are over-anxious or pressuring their child. From their own clinical experience in observing children's deviant speech and language development, Gofman and Allmond stress the importance of early recognition and understanding of these developmental deviations.

Because of the intimate relationship between language and cognition (Piaget, 1968), the importance of early identification of communication differences cannot be overemphasized. In most children, verbal comprehension and expression show

significant and rapid growth between the ages of 15 and 36 months. A child's basic language functioning, the understanding of the grammar, syntax, and pronunciation of his or her native tongue are well established by the fifth year of life (Drumwright, 1975). For these reasons, it is usually unwise to adopt a wait-and-see attitude regarding children who appear to be slow in the development of communication skills.

Rieke (In Allen, Rieke, Donitriev, and Hayden, 1971) has identified four obstacles to the early identification of children with communication problems: (1) the pre-langauge behaviors necessary to the development of communication skills have not been adequately identified; (2) there has been an unwillingness to identify any language disorders other than "doesn't talk" or "can't be understood"; (3) the silent child has been considered the result of successful management, not of potential language problems; and (4) parents often fail to recognize a problem until the child's language development is compared to peers - sometimes not until the child attends nursery school. Rieke believes that when identification occurs early, intervention can be implemented to remediate not only language and learning deficits but also their attendant behavior and social development problems (Allen et al., 1971).

Many researchers agree that it is not necessary to wait for school problems to indicate the presence of language or learning problems. McCarthy and McCarthy (1969) stress that linguistic defects can be detected at an early age and can often be remediated prior to entrance into school with the detrimental effects of such problems on secondary linguistic skills (e.g.,

reading, writing, spelling) precluded or reduced.

The major problem is being able to predict which infants and young children will develop language delays or disorders:

> It would be very enlightening to observe the speech perception and production during the babbling period of the infant who later develops deviant speech.... Two populations which are comparatively easy to define at an early age are children with Down's syndrome, and deaf children. The term comparatively easy is used since in the case of the deaf child it may be difficult to distinguish the child with peripheral perceptual damage and the child with central damage, and in the case of the child with Down's syndrome, it is not certain that deviant speech will develop (Menyuk, 1972, p. 30-31).

Early indications of differences in language development have been postulated by Francis-Williams (1974):

> (a) lack of clarity in speech even in communication with familiar teachers and children whom they regard as "friends," (b) clear speech articulation, but the failure to use language as a symbolic process and to intregrate its use into the performance of other learning tasks (1974, p. 75).

Lillywhite and his associates (1970) provide the following guidelines for the early determination of disordered language:

-- if there is an excessive amount of indiscriminate verbalizating after 18 months

-- if the child is not talking at all by age two

-- if he is not using sentences by age three

-- if the sentence structure the child uses is consistently faulty after age five, and

-- if the amount of vocalizing decreases rather than steadily increases at any time up to age seven

The possibility exists that some early individual differences in language development may be indicators of later

language delays or disorders of importance. "Detailed data on this topic are just beginning to appear, so the general observation for now must be that we have not discovered what characteristics of language in the 2 or 3-year-old are related to continued individual differences in 5 or 6-year-olds or older children or adults" (K. E. Nelson, 1977, p. 598).

Impact of Language Differences

Language delays and disorders may result in academic failure (Young and Towne, 1974), social rejection, nonadaptive emotional reactions and problems of sexual identity, the role identity (Wiig and Semel, 1976). Early language differences may also produce subtle problems in parent-child interactions which can interfere with the child's personal development (Wiig and Semel, 1976).

Gofman and Allmond have concluded that disorders in speech and language development, even in the otherwise "normal" child, are usually a symptom of more generalized central nervous system dysfunction and suggest a child with a high potential for: (1) difficulty in academic achievement, especially in the language skills of reading, writing and spelling; (2) lack of confidence in oral communication with resultant poor socialization and general lack of self esteem; and (3) difficulty in parent-child relationships, especially in the area of communication of feelings of distress, anger and disappointment. Disordered behavior may result if the child's limited language calls attention to him or her, if the child is concerned about his or her inadequate communication ability, or if listeners are unable

to readily understand the child's language.

This view has been substantiated by the results of a study of over 1,200 kindergarten children who were screened for potential learning disorders (Haring and Ridgway, 1967). Children believed to be at risk of developing learning disorders were chosen by their teachers. Each teacher was then asked to rate the identified children from his or her class on 11 performance areas, including verbal fluency, speech development, and auditory discrimination. Those children identified as poor in one or more of the 11 areas were evaluated through an extensive testing program which included: The Illinois Test of Psycholinguistic Abilities, The Detroit Tests of Learning Aptitude, PISCI Auditory Discrimination Evaluation, Wide Range Achievement Test, and several other perceptual-motor assessment procedures.

Analysis of their data led Haring and Ridgway (1967) to conclude that, although few common identifiable learning patterns were revealed, the most significant of the 31 variables measured were the language related variables. Language related variables were found to be the strongest indicators of learning problems in the classroom. Similar findings are reported by Oliphant (1970). He investigated the oral language skills of 150 first-grade children who were asked to tell a story about a sequence of pictures. Results of the study indicated that language skills are significantly related to achievement test performance.

Young and Towne (1974) also found a significant relationship between children diagnosed as having language differences during early childhood and primary school problems. They

studied 132 children, who ranged from 2.4 to 5.9 years at the time of their initial evaluation, for a period of four years. The authors noted that "the assessment instruments chosen varied according to the child's age and level of performace. Four diagnostic categories were identified: disorders in language comprehension (N = 81), expression (N = 5), articulation (N = 39), and fluency (N = 7).

It was determined by parent survey that the children with the various classifications of language disorders experienced school problems in the following pattern: 88% of those with comprehension disorders, 40% of those with expressive disorders, and 20% of those with articulation disorders were reported to have serious school problems. Young and Towne (1974) concluded that the children with language comprehension problems experienced school problems to a greater degree than did the children in any other diagnostic category. However, with the exception of those children with fluency problems, all the subjects encountered more school problems than would be found in the normal population.

Drumwright (1975) maintains that delayed or defective language development in preschool and early school years is often followed by development of serious learning disabilities in later years. In all cases, the earliest possible detection and intervention will help the child to achieve his or her full potential. The effects of early language disorders appears to be long term, affecting later growth in both social and academic development.

Etiology of Language Differences

The reasons why children develop langauge differences are not well understood. Because language is of such crucial importance to everyday life, the child who fails to acquire normal language warrants special attention. His failure may be an early indicator of neurological (Fiedler, Lenneberg, Rolfe, and Drorbaugh, 1971), emotional (Lennenberg, 1969), or intellectual problems (Bloom, 1972). Certain physiological and environmental factors are known to be related tc disordered speech development. Factors such as pregnancy and birth complications (Fiedler et al.,1971), mental retardation (Clarke and Lewis, 1972), lower socioeconomic status (Bereiter, 1972, Ralph, 1965), and central nervous systems damage (Menyuk, 1974), are common among children with different language development. Sex also appears to be a factor related to language differences. Boys with disordered and delayed speech and language tend to outnumber girls (Drumwright, 1975).

Lennenberg (1967, 1969) has discussed language differences in children suffering from central nervous system insult. Damage to the central nervous system may affect such cognitive operations as information storage, organization, and retrieval as well as the more motorically dependent behaviors of speech production and auditory speech coordination (Zarin-Ackerman, 1977).

Recent investigations of adult and early brain damage have led Isaacson (1976) to conclude:

> Brain damage occurring early in life presents quite another picture. Deficits of all sorts

> of abilities are highly correlated. Performance measures of ability correlate with language abilities, even though the capacity to speak remains. Vocabulary is restricted by brain damage. Furthermore, damage to many portions of the infant brain produce deficiencies in language abilities (p. 50).

Environmental factors which relate to language development were investigated by Moore (1968). He studied 76 London children from age six months to eight years. The variables which were found to have significant relationships to the development of language were social class as rated by paternal occupation, mother's vocubulary as defined by the synonyms section of the Mill Hill Vocabulary Test; ordinal position (earliest born), and emotional climate (acceptance and love) of the home at two and one-half years.

Congenital determinants causing language and learning disorders have been only superficially investigated according to Kavanaugh (1971). Kavanaugh suggests that further investigations of young children's language is needed in order to determine which aspects of prenatal life may affect speech and language development. Waldrop and Halverson (1971) have found that children with congenital speech and hearing problems have approximately twice as many minor anomalies as do normal preschool children.

Although the reasons why some children develop language differences have not been established, many researchers have found evidence supporting the presence of speech and language differences among hyperactive children. McCarthy and McCarthy (1969) indicate that disorders of both behavior and language are

the most frequently cited characteristics of learning disabled children. Stewart and associates (1966) state that the prevalence of disordered speech development and other language differences in hyperactive children suggest that brain dysfunction, rather than primarily psychological factors, is the basis for hyperactivity.

Wichamin (1972), a physician who has investigated the use of drugs with young hyperactive children, has observed that many hyperactive children do not say single words until well into their second or third year and do not use short sentences until even later.

Friedlander (1975) summarizes a concern for better understanding language disorders by stating:

> There is hardly any such thing as a minor language problem. Any substantial degree of language dysfunction can be assumed to be either the cause or the effect of seriously disruptive developmental disability (p. 52).

Assessment of Language Development and Differences

The study of language development and differences has produced many language assessment devices, ranging from those emphasizing disorders of speech production, such as fluency, articulation, and voice (Denver Articulation Screening Exam), to those emphasizing concept formation (Stycar Language Test), vocabulary development (Peabody Picture Vocabulary Test) and an analysis of the semantic and syntactic components of language (ELI, DSA). 1/ Chart 1 briefly describes some of the instruments

1/ Several investigators (Chappell and Johnson, 1976; Mittler, 1976) suggest evaluating a child's play behavior because "some kinds of play seem to be particularly relevant in building foundations for language development" (Mittler, 1976, p. 15).

which are available to assess young children's language development.

It is evident from this chart that the methodology in the majority of available instruments requires parental report or structured direct testing which limits the language variables to be evaluated (Bloom and Lahey, 1978). Most of the listed assessment procedures require only ten to thirty minutes. It is difficult to accept this brief exposure to a child's language as more than an initial screening of language development.

Bloom and Lahey (1978) support the use of standardized language assessment instruments for some purposes.

> If the objective of assessment is to identify a language disorder (i.e., to determine if the child's language skills are appropriate for the child's age), then the descriptions of language behavior that are most relevant are norm-referenced descriptions. The norms that are used for the purpose of determining if there is a language disorder may be based on developmental milestones or scores from a standardized test (p. 366).

Only by the adequate assessment of language differences can appropriate intervention be established. Meier (1973) stresses the need to assess language development in three modes: (1) the child's ability to repeat grammatical structures presented to him as models; (2) his understanding of these structures; and (3) his ability to produce the structures himself. The Environmental Language Inventory, a semantic-based language assessment instrument, provides for evaluation in each of these areas.

In recent years the major focus of language testing, teaching, and research has been on the development of syntax

Chart 1

LANGUAGE ASSESSMENT INSTRUMENTS

Name of Instrument	Age	Time Required	Methods	Aspects of Language which are Assessed
Assessment of Children's Language Comprehension (1973)	3 - 7 yrs	15 min	Structured test	Receptive (cognition)
Bzoch-League REEL (1971)	0 - 3 yrs	15 min	Parent report	Receptive, expressive
Carrow Elicited Language Inventory (1974)	3 - 8 yrs	45 min	Imitation	Grammar
Communicative Evaluation Chart (1963)	3 mo - 5 yrs		Parent report	Development, comprehension
Developmental Sentence Analysis (1974)	2 yrs	60 min	Spontaneous sample	Syntax, grammar, m/u
Environmental Language Inventory (1974)	2 - 4.5 yrs	60 min	Spontaneous sample, imitation	Semantic, grammar, m/u
Fluhartz Preschool Language Screening Test (1975)	3 - 6 yrs	10 min	Structured Test	Phonology, syntax, semantics
Houston Test for Language Development (1957)	0 - 6 yrs	30 min	Observation	"Functioning"
Illinois Test of Psycho-linguistic Ability (1968)	2 - 10 yrs	60 min	Structured Test	Psycholinguistic functioning

CHART 1 (Cont'd)

Name of Instrument	Age	Time Requires	Methods	Aspects of Language which are Assessed
Northwestern Syntax Screening Test (1971)	3 - 8 yrs	20 min	Structured Test	Receptive, morphology, syntax
Peabody Picture Vocabulary Test (1965)	3 -	10 min	Structured Test	Vocabulary
Porch Index of Communicative Ability in Children (1974)	2 - 5 yrs	60 min	Structured Test	Verbal, gestural, graphic
Speech and Language Screening Test for Preschool Children (1974)	2 - 6 yrs	20 min	Structured Test	Articulation, imitation, receptive
Preschool Language Scale (1969)	2 - 7 yrs	30 min	Structured Test	Receptive, expressive
Sequenced Inventory of Communication Development (1975)	4 mo - 4+ yrs	-	Structured Test	Expressive, receptive
SRC Language Development Scale (1975)	0 - 6 yrs	30 min	Observation, parent report	Receptive, expressive
Utah Test of Language Development (1972)	9 mo - 16 yrs	30 min		Expressive, receptive
Verbal Language Development Scale (1971)	1 mo - 15 yrs	30 min	Structured Test	Receptive, expressive
Vocabulary and Grammar Tests (1970)	2.5 - 5 yrs	-	Structured Test	Grammar, syntax

(Siegel and Broen, 1976). While the syntax of a language provides some of the meaning, the words included in an utterance, the semantic-grammatic rules which govern those words, and the concepts which underlie the vocabulary are very important in the assessment of language development.

Developmental Sentence Analysis, designed by Lee (1974), provides a frequency count of the number and syntactic categories in a child's spontaneous language sample. Recent literature clearly shows that syntactic analysis of a child's utterances can no longer be considered adequate to describe language development. The Environmental Language Inventory (ELI), which reflects the contributions of Bloom, Brown, and Schlesinger concerning language acquisition, was used in the present study to assess the language samples of all the children who had utterances which were at least two words in length.

Bloom and Lahey (1978) believe that the best way to assess a child's language is through the analysis of the child's spontaneously occurring speech. They further suggest that the sample should be collected in the child's home or in the least structured environment possible. Of course, there are obvious problems involved in the analysis of spontaneous language samples, not the least of which is collecting a sample which is representative of the child's range of abilities (Gleason, 1977).

Any assessment of children's language that does not consider the context of the utterances will often ignore the knowledge or competence that the utterance reflects (Brown, 1973;

Schlesinger, 1971). Both Developmental Sentence Analysis and the Environmental Language Inventory require the recording and analysis of spontaneous language samples. Accordingly, the interpretation of the children's utterances in the present study took into account the contexts in which the language was produced, the nonverbal aspects (gestures and expressions), and the intonation of the utterance (Menyuk, 1976).

New language assessment instruments for early language development can be expected as a result of recent research. Such instruments may very well allow us to more effectively describe, interpret, and, ultimately, understand early language acquisition and differences.

Intervention for Language Different Children

Early language intervention programs have been shown to be successful for the disadvantaged and the retarded (Bereiter, 1972; Evans, 1975; Drumwright, 1975; Hutchison, 1972; Marshall and Hegrenes, 1972; Raffler-Engle, 1975). As a result of recent research on normal language development (Bloom, 1970; Brown et al., 1964; Schlesinger, 1971), an astonishing number of strategies are being developed for children with different language development.

Within the past several years, at least three such strategies, all appearing to be conceptually sound, have been developed and published (Bricker and Bricker, 1974; Miller and Yoder, 1974; MacDonald and Blott, 1974). Holland (1975) has also designed a model intervention program. Her model delineates 35 core lexicons and rationale for each chosen word. Holland

suggests that early language intervention programs should emphasize the present (here and now), teach words which are significant to the child, attempt to provide language context which is generative to later unassisted language learning, and teach communication skills, not just labels.

Lahey and Bloom (1977) support Holland's intervention ideas, further suggesting that the language concepts chosen for intervention should be based on the following criteria: ease by which the concept can be demonstrated in context, potential usefulness to children, and organization of lexical items according to the ideas encoded. Bricker (1976) has also presented a model intervention program for young language-disordered children based on a "communication-oriented" approach which emphasizes the development of a functional language repertoire.

Language is a complex, generative system which seemingly develops "naturally" without formal intervention in normal children. It appears, moreover, that it can be taught to langauge-deficient children (Marshall and Hegrenes, 1972; MacDonald and Blott, 1974; Yoder and Mittler, 1972). However, Muma (1977) emphasized that language intervention differs from natural language learning in several respects: content, pacing, sequence, reinforcement, and context issues. All of these, according to Muma, are inextricably related. Muma presents six major language intervention strategies which he believes takes these differences and interrelationships into account.

Summary

The body of knowledge concerning normal and different

language development is in the midst of a great expansion. Research and practice concerning young children's language "are coming together, though the gap between them is still uncomfortably wide" (Mittler, 1974, p. 577). There is, however, still considerable uncertainty about effective strategies and tactics necessary for the assessment of young children's language.

Friedlander (1975) has urged "great energy, substantial resources, and special concern be devoted to the search for better methods for understanding the needs and assisting the growth of children who must overcome unusual liabilities in their efforts to join the human community through the medium of language" (p. 527). Horton has similarly urged that our ultimate concern must center on how to structure the early years of life to facilitate development of language in individuals whose competencies in language are universally at risk (Horton, 1974. To activate intervention at the earliest possible stage of development, appropriate screening and assessment devices must be established to identify those children who have potential for language differences.

Summary of the Literature Review

As this review of the literature demonstrates, the topics relevant to the present study are controversial, but rapidly expanding areas of concern to professionals in many disciplines. Current knowledge of early identification, minor physical anomalies, behavior disorders, and language development is often based on empirical methods and expert opinions that

generate more questions than they answer. However, it is generally agreed that early identification of and treatment for developmental disorders is advisable.

There is a general lack of professional agreement as to the definitions, symptoms, etiology, and measurement of both behavior disorders and language differences. The literature reviewed points to the fact that children with behavior disorders or language differences, like other children, are remarkably different from each other in a variety of dimensions of development and behavior. It would undoubtedly be useful to know the the characteristics and causal influences of those children in whom behavior disorders and language differences are associated with significant impairment of academic and social functioning.

There has been a growing interest within medical genetics and pediatrics in the relationship between congenital minor physical anomalies which are identifiable at birth and other developmental deviations. Recent studies have indicated that the presence of minor physical anomalies may be an early indication of children who are at risk of behavior disorders and language/learning differences later in life. The present investigation contributes to our understanding of developmental differences in language and disorders in behavior and our knowledge concerning the relationship between these disorders and the incidence of minor physical anomalies as a technique for early identification of these disorders.

CHAPTER III

METHODS AND PROCEDURES

The major goal of this study is to establish the value of early screening for minor physical anomalies as a technique for early identification of developmental differences in the language and behavior of two-year old children. A second goal is to investigate whether there is a significant correlation between behavior disorders and language delays or disorders in selected two-year old subjects. To fulfill these goals, a variety of methods, procedures, and instruments were selected.

The methods and procedures involved in this investigation are discussed in this chapter. The first section of this chapter presents a description of the sample chosen for the study. The 50 two-year old children selected for the present investigation are participants in a prospective research project at the Georgetown University Hospital Child Development Clinic. The second section of this chapter describes the manner in which the language and behavior data were collected. The choice of naturalistic data collection in each child's home is discussed and supported. A descriptive sequence of a home visit, including the planning, arrangement, and implementation, is provided. The manner in which the language and behavior data was recorded, transcribed, and scored in discussed in the third section. The final section of this chapter addresses the criteria for selection of the instruments employed in the study: The Preschool Behavior Questionnaire, Environmental Language Inventory, and the Developmental Sentence Analysis.

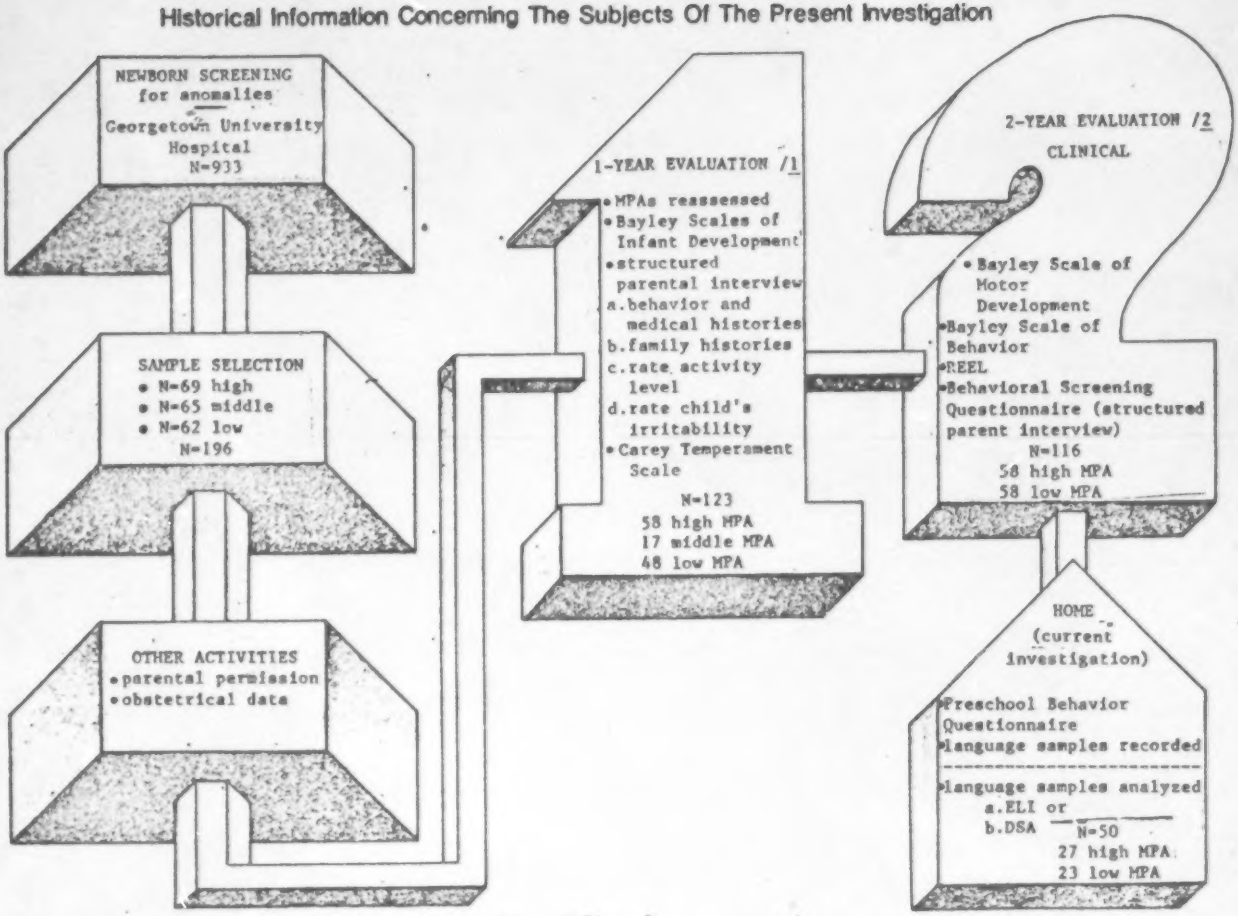
Selection of the Sample

The research sample is composed of 50 two-year old children who were screened at birth for the presence of minor physical anomalies. These fifty subjects are members of an original population of 933 white, private care infants of intact families born at Georgetown University Hospital during 1974-1975. Figure I (on page 85) identifies the major stages and evaluation procedures which have been completed by the children in the sample. The larger population was screened for the occurrence of individual anomalies as well as weighted score by Marilyn Renfield, M.D., after preliminary training with Mary Waldrop, M.D. at the National Institute of Mental Health. Interrater reliability between Drs. Patricia Quinn and Marilyn Renfield for a series of 30 newborns was .81. Ten percent of the sample was found to have weighted anomaly scores of five or greater, while 11% had a weighted score of zero or one. There were no significant sex differences with regard to anomaly score. A brief neurological examination did not correlate with anomaly score.

Infants from the "high" (N = 58) and "low" (n = 65) anomaly groups were seen at one year of age. At that time the anomaly scores were reassessed and found to correlate with the newborn score (r = .83). The Bayley Scales of Infant Development (Bayley, 1971) were administered by a psychologist at the Child Development Clinic. There was no significant difference between the high and low anomaly groups on the Bayley Mental Scale. Both groups scored within the average range.

Figure 1.

Historical Information Concerning The Subjects Of The Present Investigation



#1 Reported in Quinn,Renfield,Burg,and Rapoport,1977.
#2 Clinical assessment and PBQ data reported in Burg,Hart,Quinn,and Rapoport,1978.

A structured series of questions concerning the child's general health, injuries, accidents, and patterns of eating, play, and sleep were included in the parent interview. A history of specified difficulties such as allergies, head banging, or sleep disorders was also obtained. Mothers rated their child on a five-point scale for degrees of irritability (whining, strong response to minor stimulus, and temper tantrums). There was a significant correlation between a greater irritability rating and anomaly scores at birth and at one year.

Mothers also completed a global three point activity rating of their child - "more active", "less active", or "the same as other one-year olds, who are all motorically active and exploring". Twenty three children in the sample were thus rated as "overactive".

Raters who were blind for newborn anomaly score and obstetrical history collected behavioral and medical histories as well as family histories of learning and/or behavior problems. The assessment completed at one year of age indicated that in the high anomaly subgroups rated as hyperactive and irritable there was a positive correlation with obstretrical complications or a family history of learning and/or behavioral disorders. This finding supports the possibility of a relationship between congenital (i.e. genetic or toxic) factors and behavior disorders for this subgroup of children.

A complete discussion of the newborn screening and the clinical assessment completed as the subjects reached their

first birthdays can be found in "Minor Physical Anomalies: A Newborn Screening and One Year Follow-Up" (Quinn, Renfield, Burg, and Rapoport, 1977).

At two years of age, 116 children were seen in a follow-up visit to the Georgetown University Hospital Child Development Clinic. The two year sample included 54 females and 62 males; 58 were low anomaly children and 58 had a high anomaly score.

The Bayley Scales of Behavior and Motor Development (Bayley, 1969) and the Receptive-Expressive Emergent Language Scale (REEL) (Bzoch, 1971), were used for developmental assessment of each child. Behavioral ratings selected for analysis during the one year evaluation were re-examined at age two. A rating of each child's cooperation was made by the psychologist. This rating was considered likely to reflect behavior problems at two years.

A structured parent interview was completed using the Behavioral Screening Questionnaire devised by Richman and Graham (1971). This questionnaire was originally devised for use with parents of three year old children and was later used in an epidemiologic study (Richman, Stevenson, and Graham, 1975). The instrument was considered appropriate for use with parents of 2-year-olds after a minor language change. Administration of the questionnaire resulted in information concerning the child's development, health, and behavior and has been used to identify children with developmental delay or behavior difficulties. Interrater reliability for fourteen consecutive interviews between this investigator's and the clinical psychologist's

rating of the same interview, was .95. On only one item was there a two point difference in scoring, and one point differences in scoring, and one point differences on the remaining items were divided among the 14 cases.

Ratings of problem behaviors common in two year olds were obtained from selected questions of the Richman-Graham interview (See Appendix K). Scores on fifteen items concerning possible problem behaviors were summed. These items are eating, sleeping, vomiting, head banging, rocking, tics, activity, concentration, relationships with siblings and other children, dependency, controls, tantrums, mood, and worries. Items are scored 0, 1 or 2 and summed to provide a Behavior Score.

The clinical evaluation completed at age two indicated that anomaly score alone "does not predict total problem behaviors at age two: nor did any correlation of newborn and one year behavioral measures" (Burg, Hart, Quinn, and Rapoport, in press). Scores on the Bayley Scales and the REEL did not differentiate high or low anomaly groups at age two. However, high anomaly males at age two were rated as less cooperative by the psychologist ($X^2 = 11.05$, $p < .05$). High anomaly males were reported by their parents to be more irritable ($X^2 = 8.23$, $p < .01$), and to have more night waking ($X^2 = 6.88$, $p < .03$). High anomaly females demonstrated more negative emotional tone during the clinical evaluation ($X^2 = 12.05$, $p < .05$). These were the only significant findings related to presence of anomalies.

No significant correlation was found between the

parents' rating of the subjects' hyperactivity at one or at two years ($r = .15$). A significant but low correlation was established between the interview ratings of irritability between ages one and two ($r = .23$, $p < .01$). The Behavior Problem Score from the parent interview showed some consistency with the psychologist's ratings of difficult behavior during the clinical evalution. Significant correlations were found between the ratings of Emotional Tone and Total Behavior Problem Score ($r = .41$, $p < .01$) as well as maternal reports concerning tantrums ($r = .38$, $p < .01$). The child's activity level was rated similarly by the mother and the psychologist ($r = .33$, $p < .01$).

A subgroup of 50 children was chosen from the highest and lowest 25% of the sample with respect to the Behavior (Problem) Score. The range of the 50 scores was 1 - 16 (means = 6.6, SD = 4.4). Selections for this subgroup included an equal sampling of children from the high and low anomaly groups. The sample also included an approximately equal number of males ($n = 27$) and females ($n = 23$). Children were chosen by the clinical team. At no time was the present investigator privy to any data concerning a child's development, behavior, or anomaly score. It is this group of 50 2-year-old children who comprise the sample of this study.

Collection of the Data

Naturalistic Observation in the Home

In order to collect data concerning the subjects' development in the most "natural" of settings, direct observation in

each child's home was the chosen strategy. The home visits included unstructured taping of spontaneous language and simultaneous observation of behavior which was rated after the visit (Preschool Behavior Questionnaire). They also included the taping of structured language tasks (Environmental Language Inventory, Conversation and Imitation). Although the physical setting differed from family to family, the stimuli presented by the investigator remained constant for all subjects (See Appendix C for stimuli used during home visits).

The strong point of naturalistic observation is the immediacy and first-hand nature of the data. The principal objection to the method is the argument that the data thus obtained are no longer representative of what normally occurs since the presence of the observer effects and changes the environment. However, both Bijou and Peterson (1971) and Lytton (1971) point out that data arising from experiments or psychometric tests are similarly affected by the presence and the characteristics of the observer and that interview data are also subject to distortion. Although the two-year old subjects were sometimes initially shy or eventually developed "show off" behavior during the observer's visit, the age and concomitant egocentricity of the subjects precluded their deliberate manipulation of behavior and language during the visit. Lytton (1971) confirms this hypothesis by observing that "the behavior of young children is less affected by the presence of an observer than that of their elders".

A "strength" of the collection of home observation data

as described herein lies in the fact that prior to the visits, specific behaviors were specified for observation. It is these behaviors (on the Preschool Behavior Questionnaire), rather than any specific activity, which this investigator rated.

It is known that the observer's values, psychological set, language framework, and familiarity with the subject are among the variables which can influence the act of observation (Connors, 1975). For these reasons, the investigator of the present study was "blind" to any developmental data concerning each child and also was "blind" to the child's anomaly score. Interrater reliability was also established. 1/

The strategy for estimating the accuracy of observation data collected by the investigator of the present study consisted of comparing the protocols of this investigator and another observer, 2/ who independently rated the behavior of a group of the same children. Four preschool children were each observed in their homes for approximately one hour. After each observation period, the child's behavior was independently rated on the Preschool Behavior Questionnaire. On only one item was there a one point difference in scoring, resulting in an interrater agreement of .99.

1/ For a more complete discussion of observer reliability, observer bias, reactivity to observer presence, observer drift, and stability of even estimation, see Caldwell (1972), Jones, Patterson, and Reid (1975), and Lytton (1973).

2/ The other observer was completing her doctoral studies in nursing at Catholic University, that observer also used the Preschool Behavior Questionnaire as a research instrument. The "reliability" population was independent of the subjects discussed herein and was observed and rated before the present study was implemented.

A recognized problem in the assessment of young children's performance is their lack of consistent cooperation (Yang and Bell, 1975). Rapport and attention are factors which must be confronted when assessment of preschool children is planned. In addition, the strategies outlined above required that rapport be established with both the child and parent. If the mother perceived her child to be upset or not performing well, her subsequent anxiety might have an adverse effect on the subject's performance. This investigator believes that her range of professional and interpersonal skills and experience with both young children and adults were adequate to overcome this potential problem.

Although attrition is a concern in research studies of human behavior, the problems accompanying attrition were not significant for this investigation since the parents of each subject had consented to participation in the study and because the 50 subjects were chosen from a larger controlled population.

Specific Case Strategy

All home visits occurred at 4:00 p.m., the period of time following the afternoon nap and preceding the dinner hour. An appointment for each visit and directions to the home were originally arranged by telephone by a staff member of Georgetown University Hospital Child Development Center. After approximately half of the subjects had been visited, the present investigator took full responsibility for these arrangements. This change was made to avoid any communication difficulties

arising from the transfer of information. This investigator called the home during the morning of the scheduled visitation day to confirm the appointment and check travel directions.

Mothers (the parent most likely to be involved) were asked to follow their "normal" afternoon schedule. The only stipulation required was that both mother and child be present in the home during the visit. If this criterion was difficult to meet on a weekday due to employment or other commitment outside of the home, the present investigator arranged to visit the home on a weekend day, also at 4:00 p.m. Four such Saturday visits were arranged. The mothers of the 50 children were always available during the visits. Siblings or peers were present for approximately 25 of the visits and fathers were present for five of the home visits.

The visits were of approximately 90 minutes duration. Upon arrival, the investigator communicated to the mother a brief description of the planned procedures as well as the expected time duration. Consent was obtained to allow this observer to go to any part of the home where it was necessary to observe the subject.

The investigator immediately began recording the spontaneous language of the subject. If a child had limited verbal output, it was especially important to collect all utterances which occurred during the visit. Taping was done

with a small inconspicuous portable cassette recorder. 1/

An initial period of time was allowed for the child (and others) to become comfortable with the investigator's presence. The length of the acclimatization period varied among subjects but usually did not exceed five minutes. The investigator observed the child's behavior as he or she played alone or interacted with the mother or others in the home. The mother was requested to encourage the child's optimal verbalizations and to interpret unintelligible (to the observer) utterances, if either were deemed necessary.

The conversational and imitation tasks of the Environmental Language Inventory (ELI) were introduced (as outlined by the ELI Manual) after approximately 30 minutes. If the subject expressed an earlier interest in the stimulus objects for the ELI, the materials and tasks were introduced at that time. If the child failed to respond to 10 of the 30 stimulus sets, administration of the structured ELI tasks was discontinued and efforts - either passive or active - were made to assure sampling of at least 50 spontaneous utterances to be analyzed. Twenty three children completed the ELI conversation tasks and 22 completed the ELI language imitation tasks.

1/ Tyack and Gottsleben (1974) describe the temptation to directly write down the utterances of a slow-speaking child. They point out that it is a common adult error to filter what a child says through the adult's own grammatical system and so change what the child actually said. Taping provides a check on this type of error. Taping is necessary when one is assessing the language of a child who speaks quickly and often. An important advantage of taping language samples is the capability to replay passages which are difficult to decipher.

The visit was temrinated after the investigator had completed the ELI tasks, recorded at least 50 spontaneous utterances, and had observed an adequate sampling of behavior to assure the completion of the Preschool Behavior Questionnaire or after the expiration of 90 minutes.

Scoring, Transcribing, and Analyzing Data

Each subject's behavior was rated immediately on the Preschool Behavior Questionnaire. Immediately is defined here as being within 30 minutes after the termination of the home visit. Ratings were made either in the investigator's car or upon arrival at her home.

The taped language samples were transcribed as soon as possible after the taping session by the same investigator who gathered the sample from the child (Gottsleben and Tyack, 1974; Lee, 1971). This procedure increased the accuracy of the transcription for the present investigator remembered nuances of the sample. Recorded tapes have been retained.

In addition to transcribing the subjects' utterances, non-linguistic information about the context of each utterance was noted (as suggested by Bloom, 1975). This procedure provided information as to the relationship between the input of others or the environment and the output of the child. The linguistic record was transcribed in traditional orthography in accordance with the guidelines (which was adapted from Bloom, Lightbown, and Hood (1973), and from Brown (1973)) reproduced on page 96 .

GUIDELINES FOR TRANSCRIPTION OF LANGUAGE SAMPLES

1. If a response is a clearly disernable word, word is written as heard. The response need not be a perfect articulation, only intelligible.

2. If a response is an unintelligible utterance of undetermined length, nothing is transcribed.

3. If an utterance is a combination of intelligible and unintelligible words, each unit is recorded as appropriate; ex. "my car go --" indicates the utterance included three intelligible words with a forth unintelligible word ending the utterance.

4. No utterance is transcribed twice, although repetitions or verbal perserveration are noted.

5. Fillers, such as mm or oh, are not included, but no, yeah, and hi are transcribed.

6. Record as single words all compound words (two or more free morphemes), proper names, and ritualized reduplications. Examples: birthday, rackety-boom, choo-choo, quack-quack, night-night, pocketbook, see saw. Justification is that there is no evidence that the constituent morphemes function as such for young children.

7. Record as one word all irregular pasts of the verb (got, did, went, saw). Justification is that there is no evidence that the child relates these to present forms.

8. Record as one word all diminutives (doggie, mommie) because young children at least do not seem to use the suffix productively. Diminutives are the standard forms used by the child.

9. Record as separate word all auxilliaries (is, have, will, can, must, would) and all catenatives: gonna, wanna, hafta. These latter count as single morphemes rather than as going to or want to because evidence is that they so function for children.

10. Record as one utterance the words which combine to communicate a complete thought.

The strategy for estimating the accuracy of the transcribed language samples completed by the present investigator consisted of comparing her transcriptions with those of another professional who independently transcribed the language of two of the study children. Tables I and II list the first 25 utterances of each child (Subject A and B) which were transcribed by the present investigator and how those same utterances were transcribed by Ms. Susan Chizner, a Speech and Language Therapist. See Charts 2 and 3 on pages 98 and 99.

A comparison of the two lists of transcriptions for Subject A discloses the following: 13 of the 25 utterances were the same; the present investigator's (DH) list of utterances included five words more than Susan Chizner's (SC) list; SC's list included two words not included by DH; and the mean length of utterance (MLU) for the two lists is 3.80 and 3.77 respectively. In addition to the matched 25 utterances listed, SC had also transcribed the following four utterances - mommy, yeah, Hi, wanna pee. If these four utterances are included in the MLU computation, the child's MLU is 3.40. One way of expressing the transcriber agreement is to say that 89% of the time the utterances were the same in length and rules.

A comparison of the two lists of transcribed utterances of Subject B indicates the following: 13 of the 25 utterances were the same; an additional three utterances transcribed by DH were transcribed as six utterances by SC although the same words were recorded; one utterance was mostly unintelligible to SC; while an occasional word was recorded differently by SC

CHART 2

First 25 Utterances Transcribed by DH and
Matched Utterances Transcribed by SC

D.H.	SUBJECT A	S.C.
Giddy up		Same
I'm gonna push his nose		I pushes nuts
I gotta gonna getty my mouse		Forget it/give me my mouse
I'll get it		Same
Get on it		Same
He doesn't fit on		doesn't fit on
You gonna jump it		It has a jump on it
I'm gonna getty up		I'm gonna ride on it
On top of my head		I told you what I said
There's a book shelf right up there		Same
How bout my rabbit		Same
You can play with it		Play with it
Go like this		Same
This one goes here		This is all here
You fit it		Same
You do like this		And do like this
Where's this go		What's this do
Here's a strawberry		Here's the strawberry
You can have it		You you did it
Now you did it		Same
Do it again		Same
Pull it		Same
Something different		Same
There's a big man at home		Same
Do my rabbit again		Same

CHART 3

First 25 Utterances Transcribed by DH and Matched Utterances Transcribed by SC

SUBJECT B

D.H.	S.C.
What is mommy going to get	What is mommy gonna get
Not for little boys	It's not for little boys
I drink apple jucie	Same
It's broken and it's falling off	Same
I need the silver wrench to fix something to fix this chair	I need the silver wrench to fix this something to fix this arm
The silver wrench daddy uses down in the basemt	The silver wrench daddy uses down in the basement
It's falling off	Same
I need the little one	Same
I need daddy's heavy wrench down the basement	I need daddy's heavy wrency down in basement
I will be very careful with it	I gonna be very careful with it
This is for the heavy wrench	Same
Bang nails	Same
Large heavy hammer I can't have but I can only have the wrench	My heavy hammer I can't have but I can always have the wrench
What can I fix this with	What did I fix it with
Don't you sitting on daddy's ottoman	Same
You're sitting on it	Got to hit it
On here	Same
Don't take the wrench	Don't take the watch
Can it go, mom, can it go	Same
Can the car go	Same
I can fix wrench	I can fix it
Make it go to me	Same
Here it comes	Same
Faster than that	Same

than that by DH seldom was the meaning or rule content changed; [1/] and the computed MLUs are 5.32 and 4.71 respectively. Of the total 265 words transcribed by the two recorders, only 17 were different, or 94% of the words transcribed were the same.

Each utterance was examined and the semantic-syntactic relationships among words were identified by observing the relationship between the utterance and aspects of the child's behavior and the situational context in which the utterance occurred. Examination and scoring of the language samples by the Environmental Language Inventory (ELI) or Developmental Sentence Analysis (DSA) procedures occurred after all home visits had been completed and after transcription of all the recorded language samples. Environmental Language Inventory analysis of 35 language samples was performed by Susan Chizner, a Speech and Language Therapist. Developmental Sentence Analysis of the remaining 11 language samples was completed by the present investigator. Two subjects had no intelligible language and the recorded tapes of two subjects were lost because of mechanical malfunctioning. In one case the batteries were improperly placed in the recorder and in the other case the batteries became depleted.

Instrumentation

Criteria for Selection of Language Assessment Instruments

Attempts to identify and classify language behavior have produced many instruments of varying quality. Acceptance

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1/ A exception to this is the utterance "You're sitting on it" recorded as "Got to hit it" by SC.

of an individual test by a wide-range of professionals does not appear to be necessarily related to the quality of the test. Often, less relevant criteria, such as ease of administration or speed of scoring, are determining influences in the choice of a test of language ability.

An assessment of language must be based on a viable instrument that is defensible from a theoretical and practical point of view. For this reason, the following criteria which represent a summary of suggestions offered by experts in the field of language development, were considered in the selection of an instrument to measure the language development of two-year old children:

1. The instrument should reflect a knowledge of normal language development. Recent research has considerably broadened our understanding of the developmental nature of language. This research emphasizes the concept that both qualitative and quantiative differences appear as a child's language develops.

2. The instrument should reflect the complexity of human language and its many related subsystems (Friedlander, 1970; Johnson, 1975). Analysis of such major subsystems as the phonological, syntactic and semantic aspects of language is essential to a complete assessment. The instrument's structure should reflect the fact that, although subsystems are integrally related, a child's skills may not be identical in each area of language (Siegel and Broen, 1976).

3. The instrument must be designed for use with children, i.e., not a parental interview questionnaire.

4. The instrument should be able to evaluate the child's knowledge of language as well as his observable performance (comprehension and production). It should indicate what the child can do spontaneously, not just what he did in a structured situation with such intervening factors as memory, motivation, and attention. The assessment procedure should indicate the child's knowledge of when, where, why, and how to use the rules that govern our language (Murna, 1973). It would be useful to sample kinds of performance, such as comprehension and imitation, in addition to production.

5. The instrument should be adequately standardized to permit interpretation of test performance (Weiner and Hoock, 1973). Norming should not reflect a particular class - such as middle-class white - which renders interpretation of other children's performance misleading. The instrument must also be appropriately normed for the age level of the subjects.

6. The instrument should emphasize the degree of occurrence of language behaviors as opposed to the traditional emphasis on presence or absence. The mere indication that a behavior has been acquired does not communicate its prevalence in the child's repertoire.

7. The instrument should include concise, errorless directions for administration and scoring. Interpretation of the scores should be equally well explained.

8. Interpretation of a child's performance on the instrument should provide guidelines for the necessary type of language intervention program.

A review of the available tests of language functioning (See Chapter 2) indicated that none of them meet all of these criteria. The Environmental Language Inventory meets substantially more of these criteria than other language assessment instruments and is the one used in this study to assess the language development of all children who are using two-word utterances. For those children who are using language limited mostly to one-word utterances, Developmental Sentence Analysis was chosen as the instrument best meeting the criteria listed above. A brief description of these two instruments follows. More detailed information concerning administration, scoring, and standardization is in the Appendices.

Environmental Language Inventory

The Environmental Language Inventory (ELI) is a semantic based diagnostic instrument of early language development. The scale was designed to assess the child whose language is primarily composed of two-word utterances.

The ELI selects as the content for diagnosis those semantic grammatical rules, i.e., meaning units, which comprise the first sentences of normally developing children.

Data Available From the ELI

I. Semantic-Grammatical Rules
   A. Frequencies of rules in
      (I) Imitation (C) Conversation (P) Play
   B. Rank order of rules in
      (I) Imitation (C) Conversation (P) Play
   C. Proportions of rules in
      (I) Imitation (C) Conversation (P) Play

II. Utterance Length
   A. Mean length utterance
      Total words (MLU_T)
      (I) Imitation (C) Conversation (P) Play
   B. Mean length utterance
      Intelligible words only (MLU_I)
      (I) Imitation (C) Conversation (P) Play

III. Intelligibility
   A. Proportion of intelligible words
      (I) Imitation (C) Conversation (P) Play
   B. Frequency of unintelligible multiple word utterances
      (I) Imitation (C) Conversation (P) Play

Developmental Sentence Analysis

The Developmental Sentence Analysis (DSA) (Lee, 1974) is an individually administered procedure which provides a way of measuring language development in terms of the increasing grammatical load of a child's spontaneous speech in conversation with an adult clinician. Developmental Sentence Types (DST) procedure is used to classify pre-sentence utterances.

Data Available from the DSA	
Frequency of Single Word Utterances,	Total
	Nouns
	Designators
	Adjectives
	Verbs
	Vocabulary Items
Frequency of Two-Word Combinations,	Total
	Noun Phrases
	Designatives
	Predicatives
	Verbals
	Fragments
Frequency of Constructions	
Frequency of Complete Sentences	

Criteria for Selection of Behavior Assessment Instrument

Attempts to identify and classify behavioral disorders have produced many instruments of varying quality. There are over 200 instruments available for detecting behavioral or emotional disturbances in preschool children (Stringfield and Woodside, 1976). Most of these are discussed in Socioemotional Measures for Preschool and Primary Children (Walker, 1973). Only eighty of these scales are adequately standardized and possess adequate validity and reliability (Stringfield and Woodside).

Socioemotional instruments are available to measure attitudes, general personality and emotional adjustment, interests or preferences, self-concept, social skills, and behavior traits. Available measurement techniques include projective techniques, observation procedures, unobstrusive measures, self-report measures, situational measures, and rating

scales. The following criteria, summarized from the literature concerning behavior assessment, were considered in the selection of an instrument to measure the behavior characteristics of two-year old children:

1. The instrument must be designed for use with children, i.e., not a parental interview questionnaire.

2. The instrument must be suitable for the age level of the population under study (C.A. - 2.0).

3. The instrument should emphasize the degree of occurrence of behaviors as opposed to the traditional emphasis on mere presence or absence of such behaviors. The mere indication that a behavior has occurred does not communicate its prevalence in the child's repertoire.

4. The instrument should include concise, errorless directions for administration and scoring. Interpretation of the scores should be equally well explained.

5. The instrument must be usable, in the technical sense of the term. For example, a measure involving bulky, expensive laboratory equipment would not be appropriate.

6. The instrument must be designed for or be adaptable to use during home visits where interaction with peers cannot be guaranteed.

7. The instrument must measure what it was intended to measure. Available validity information as well as operational definitions would support this criteria.

8. The instrument should include a description of the standardization procedures - preferably on children as young

as two-years old. Standardization should not be limited to a specific exceptional population such as the emotionally disturbed or mentally retarded.

9. The instrument must be appropriate for use during a one-time observation.

10. The instrument must include hyperactivity as an identifiable behavior category.

11. If the instrument is a rating scale, the statements must be unambiguous and unbiased.

12. The instrument must not be excessively long and complicated to administer or rate.

Among the instruments for which reliability and validity data have been generated are those instruments, such as the Home Behavior Inventory and The Louisville Behavior Checklist, which are designed for parental rating of behavior. Others, such as the Social Competence Scale, Symptom Checklist, the Emmerick Classroom Observation Rating Scale, and the Classroom Behavior Inventory, are designed for behavior rating by preschool teachers and are meant to measure interpersonal functioning in the classroom.

Many measures of behavior were reviewed before an instrument was selected. Scales were located through a review of Psychological Abstracts from 1970-1976, an ERIC search, and through inclusion in Social-Emotional Measures for Preschool and Kindergarten Children (Walker, 1973), and Test and Measurements in Child Development: A Handbook (Johnson & Bommanto, 1971).

The Preschool Behavior Questionnaire was selected jointly by the clinical team originating the research project and by the present investigator after an evaluation of the available measuring instruments of preschool children's behavior.

Preschool Behavior Questionnaire

This scale was developed as a screening instrument to be used by teachers and child care workers in the early detection of children's emotional problems (Behar, 1977). The PBQ is a modification of the Children's Behavior Questionnaire, a 29 item behavior checklist previously standardized in England on elementary school children (Rutter, 1967). The Preschool Behavior Questionnaire consists of 29 items rated on a three-point scale from "Doesn't apply" to "Certainly applies". The scored answers can then be added to produce three factor scores and percentile rankings: Hostile-Aggressive, Anxious, Hyperactive-Distractible.

Since the publication of the PBQ, it has been used by professionals in a variety of situations. Behar, the developer of the Preschool Behavior Questionnaire, in 1976, surveyed those professionals who had received a minimum of 100 copies of the scale. The present investigator received the questionnaire and provided information concerning the use of the PBQ in the current project. This investigator is one of the thirteen respondents who used the scale with a total of 746 two-year old children. This investigation is also one of 36 projects in which the PBQ was applied to 510 children in non-school settings and without a peer groups being rated.

Behar (1977) expresses concern that the original norms "may or may not be appropriate" when used in a way which deviates from the manner in which the scale was standardized. In a conversation, [1] Behar indicated to the present investigator that the size of the population in the current study and the fact that only one investigator rated all of the subjects' behavior were important factors which strengthen the validity of the data.

Data Available From the PBQ			
Total Behavior Disordered Score	_____	Percentile	_____
Hostile Aggressive Score	_____	Percentile	_____
Anxious Score	_____	Percentile	_____
Hyperactive-Distractible Score	_____	Percentile	_____

Procedures for Data Analysis

The research design of the present investigation lends itself to a variety of statistical procedures for comprehensive analyses of the data. The following discussion describes the selected data analyses procedures.

Before Hypotheses 3, 4, and 5 could be tested, procedures necessary to determine those subjects who were language delayed or disordered had to be completed. Language delay (i.e., mean length of utterance less than two words) is a dependent variable in the third, fourth, and fifth hypotheses. Language delay was

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1/ Telephone communication during January, 1978.

statistically computed by dividing the total number of intelligible words included in the child's language sample by the number of utterances in the sample. The number of utterances was limited to 50.

A child was identified as language disordered if he or she met at least three of the following criteria, which are based on the semantic-grammatical rules analyzed by the Environmental Language Inventory (ELI) (See Appendix B):

1. Total number of rules less than 50.
2. One or more rule missing.
3. Major rules (Ag-Ac, Ac-Obj, X-Loc-AC, and X-Loc-AO) less than 50% of the total rules.
4. One or more major rules was beyond one standard deviation of the group mean.
5. Number of rules in any of the ten categories was one standard deviation beyond the group mean.
6. Major rules comprised less than 54% of the subject's rules as indicated by ELI norms.
7. Percentage of rules in any category was beyond normal range of ELI norms.

Criteria 6 and 7 were chosen after careful study of the ELI normative data. The distribution of rules portrayed in the Figure and Table in Appendix G set forth the normative data used in the selection of criteria for language disorder.

Percentages of semantic-grammatical rules for each subject were computed by summing the total number of rules and dividing each of the number of rules in each of the ten

categories into that total number of rules. The computer could then determine "Major Rules" by adding the percentage scores of the designated rules. Only after these procedures for determining language delay and disorder were completed could the hypotheses be tested.

A t-test was used to compute the t statistic to determine the level of significance of the difference between means for (1) behavior performance of the groups of subjects with high and low anomalies scores, and (2) the language differences of the same two groups of subjects. A listing of the subjects' identification numbers and anomalies group (1=low, 2=high) membership allowed the present investigator to compare the high and low anomalies groups for incidence of language disordered subjects.

A t-test was also employed to identify whether there was a statistically significant difference between the means of those subjects with both high anomalies and a history of obstetrical complications or a family history of learning and/or behavior problems and the group of subjects with low anomalies scores for language delay and disorder and behavior performance. A listing of the subjects' identification numbers, anomalies group, obstetrical complications score (0=no, 1=yes), and family history score (0=no, 1=yes) allowed the present investigator to compare the low anomalies group and the high anomalies group with selected variables group for incidence of language disorder.

All t-tests involving minor physical anomalies were computed using both newborn and one-year old scores.

Pearson correlations were used to determine relationships between the four behavior variables of the Preschool Behavior Questionnaire (PBQ) and the mean length of utterance (MLU), thus testing the relationship between behavior disorder and language delay. The behavior scores of those subjects who were determined to be language disordered were compared with those subjects who were not defined to be language disordered.

The procedures described above were employed to test the five hypotheses of this study. Additional statistical analyses were completed using data collected during the clinical evaluations of the subjects at one and two years of age (See page 84-89) and the data collected for the present investigation.

A t-test was used to determine the level of significance of the difference between means for: (1) sex and MLU, (2) sex and four PBQ scores, (3) MLU and obstetrical complications, (4) MLU and family history, (5) the four PBQ scores and obstetrical complications, (6) the four PBQ scores and family history, and (7) PBQ hyperactivity and the one-year maternal rating of hyperactivity.

Pearson correlations were used to correlate MLU and: (1) the age of the home visit, (2) the Expressive Emergent Language Scale (REEL) score determined at the two-year clinical evaluation, and (3) the Bayley Scale of Infant Mental Development score available from the one-year clinical evaluation.

The .05 level was established as the level of significance for hypothesis validation and for all other procedures completed.

All of the statistical analyses were performed using the facilities and services of The George Washington University Computer Center.

Summary

The methods and procedures for this study involved observations of the behavior of 50 two-year old children. Observations were made by the present investigator who also recorded a language sample. Behavior was rated on the Preschool Behavior Questionnaire and the language samples were evaluated by the Environmental Language Inventory, if a child was producing two-word utterances, or the Developmental Sentence Analysis, if a child was producing mostly one-word utterances. Subjects for the investigation were children identified at birth as having a "high" (5 or more) or a "low" (0 to 4) minor physical anomaly score. Data were analyzed to determine the value of screening for newborn anomaly scores for identification of developmental disorders or differences in the language and behavior of two-year old children.

CHAPTER IV

RESULTS

The results of the statistical analyses of the hypotheses are presented in this chapter. The results of the procedures performed to identify those subjects who are language delayed or disordered are described first. Completion of these procedures was necessary before Hypotheses 3, 4, and 5 could be tested. Analyses of the five hypotheses presented in Chapter I are discussed here in the same order as they were presented in that chapter.

All hypotheses involving minor physical anomaly scores were tested using both the newborn and one-year scores. 1/ Both sets of data analyses are included in the tables of this chapter. Both newborn and one-year scores yielded similar results and, therefore, only the tests using newborn anomaly scores are discussed in this chapter unless otherwise indicated.

Analysis of the data indicated that two subjects had no intelligible utterances during the 90 minute visit. Each was, therefore, identified as language delayed. Eleven subjects had a mean length of utterances of less than two words and are also identified as language delayed. The language samples of these 13 subjects were analyzed by the Developmental Sentence Analysis procedure. The mean length of utterance for all 48 subjects (the tapes of two subjects were damaged) was 2.751 with a standard deviation of 1.376.

1/ One-year anomaly scores correlated highly with the newborn score ($r = .82$, $N = 110$, $p < .005$).

Children were identified as having a language disorder by analyzing their language samples in terms of the specified criteria (See Chart 4). Four subjects met at least three of the criteria and were therefore identified as language disordered. Seven additional subjects were identified as "questionable language disordered" because they met two or more of the criteria for language disordered. Tables I and II present the results of data analysis completed to determine those subjects who were language disordered.

Because only four subjects were identified as language disordered, the decision was made to evaluate the hypothesized relationships by making descriptive observations concerning their scores. Analysis of data concerning disordered language of Hypothesis 3, 4, and 5 are presented as descriptive findings. There is recognition that if t-tests were used, there would be no significant difference between the groups.

General Hypothesis 1: It is hypothesized that the group of two-year old subjects with multiple minor physical anomalies (five or more) has a significantly higher incidence of behavior disorders as measured by the Preschool Behavior Questionnaire than the subjects with low (zero to four) minor physical anomaly scores.

Operational Hypothesis 1: There is no significant difference between the means of the groups of two-year old subjects with multiple

CHART 4

Language Disorder Identification Checklist

Criteria for Language Disorder	Subjects 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Total Number of Rules < 50	✓		✓	✓					✓								
2. One or More Rules Missing				✓✓✓		✓			✓			✓					
3. Major Rules < 50% of Total Rules	✓								✓								
4. One or More Rules > 1SD beyond Group Mean	✓	✓							✓✓								
5. Number of Rules in a Category > 1SD beyond Group Mean	✓		✓						✓								
6. Major Rules < 54% of Total Rules	✓								✓								
7. % of Rules in a Category beyond Normal Range of ELI Norms	✓			✓					✓								

1/ Agent-Action, Action-Object, X(Agent or Object) + Locative, and X(Action) + Locative.

CHART 4 CONT

Criteria for Language Disorder	Subjects 18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
1. Total Number of Rules < 50																		✓
2. One or More Rules Missing				✓	✓✓		✓			✓			✓			✓		✓
3. Major Rules < 50% of Total Rules					✓												✓	
4. One or More Rules > 1SD beyond Group Mean													✓		✓		✓	✓
5. Number of Rules in a Category > 1SD beyond Group Mean																		✓
6. Major Rules < 54% of Total Rules					✓												✓	
7. % of Rules in a Category beyond Normal Range of ELI Norms					✓								✓					✓

1/ Agent-Action, Action-Object, X(Agent or Object) + Locative, and X(Action) + Locative.

TABLE I

Number of Each ELI Semantic-Grammatical Rule Used in (50 Utterances)
Spontaneous Language Sample of 35 Two-Year Old Subjects

Subject Number	Ag+Ac	Ac+Ob	Ag+Ob	M+H-Poss	M+H-Rec	M+H-Att	Neg+X	XL-AO	XL-AC	I+X	Total Number
1	1.	10.	9.	3.	2.	6.	3.	5.	1.	1.	41.
2	14.	7.	4.	11.	1.	2.	4.	2.	6.	5.	56.
3	8.	11.	2.	6.	1.	0.	3.	4.	4.	2.	41.
4	9.	10.	5.	1.	0.	0.	3.	7.	0.	12.	47.
5	24.	26.	18.	5.	2.	4.	1.	3.	11.	5.	99.
6	26.	29.	14.	5.	0.	5.	5.	9.	11.	4.	108.
7	34.	20.	18.	10.	1.	24.	4.	3.	10.	0.	124.
8	35.	39.	26.	1.	5.	4.	2.	9.	6.	2.	129.
9	3.	2.	1.	4.	1.	7.	1.	2.	0.	3.	24.
10	17.	15.	8.	8.	7.	11.	3.	8.	7.	8.	92.
11	13.	14.	5.	3.	4.	2.	1.	1.	4.	7.	54.
12	22.	26.	17.	2.	2.	6.	0.	6.	4.	8.	93.
13	10.	17.	13.	5.	0.	0.	2.	2.	1.	0.	50.
14	23.	28.	16.	16.	4.	5.	2.	6.	12.	11.	123.
15	34.	33.	22.	6.	9.	14.	8.	13.	12.	3.	154.
16	29.	25.	24.	6.	0.	8.	0.	4.	2.	12.	110.
17	27.	17.	12.	3.	6.	7.	8.	4.	9.	4.	97.
18	38.	38.	29.	2.	1.	4.	18.	2.	15.	6.	153.
19	15.	31.	15.	3.	3.	5.	1.	5.	3.	4.	85.
20	26.	20.	15.	1.	1.	14.	7.	20.	15.	8.	127.
21	14.	13.	12.	5.	0.	5.	1.	10.	8.	7.	75.
22	18.	26.	14.	7.	6.	5.	0.	1.	0.	20.	97.
23	23.	25.	19.	3.	2.	12.	1.	5.	6.	17.	113.
24	27.	19.	13.	5.	0.	8.	2.	8.	3.	10.	95.
25	13.	23.	8.	4.	1.	1.	5.	3.	6.	5.	69.
26	34.	41.	30.	5.	3.	4.	5.	8.	5.	1.	136.
27	10.	16.	5.	6.	1.	4.	0.	2.	3.	4.	51.
28	23.	22.	21.	2.	3.	9.	5.	1.	2.	6.	94.
29	36.	36.	34.	11.	1.	7.	6.	9.	6.	5.	151.
30	9.	22.	8.	7.	1.	4.	0.	8.	5.	5.	69.
31	26.	24.	20.	3.	3.	4.	4.	4.	6.	9.	103.
32	22.	9.	4.	2.	4.	7.	8.	7.	12.	3.	78.
33	11.	10.	7.	3.	0.	5.	8.	3.	3.	4.	54.
34	10.	6.	9.	1.	5.	7.	2.	6.	4.	9.	59.
35	5.	11.	3.	7.	0.	4.	1.	4.	3.	5.	43.

TABLE II

Percentages of ELI Semantic-Grammatical Rules Used in (50 Utterances) Spontaneous Language Sample for 35 Two-Year Old Subjects

Subject Number	Ag-Ac	Ac-Ob	Ag-Ob	M+H-Poss	M+H-Rec	M+H-Att	Neg+X	XL-AO	XL-AC	I+X
1	0.02	0.24	0.22	0.07	0.05	0.15	0.07	0.12	0.02	0.02
2	0.25	0.13	0.07	0.20	0.02	0.04	0.07	0.04	0.11	0.09
3	0.20	0.27	0.05	0.15	0.02	0.0	0.07	0.10	0.10	0.05
4	0.19	0.21	0.11	0.02	0.0	0.0	0.06	0.15	0.0	0.26
5	0.24	0.26	0.18	0.05	0.02	0.04	0.01	0.03	0.11	0.05
6	0.24	0.27	0.13	0.05	0.0	0.05	0.05	0.08	0.10	0.04
7	0.27	0.16	0.15	0.08	0.01	0.19	0.03	0.02	0.08	0.0
8	0.27	0.30	0.20	0.01	0.04	0.03	0.02	0.07	0.05	0.02
9	0.13	0.08	0.04	0.17	0.04	0.29	0.04	0.08	0.0	0.13
10	0.18	0.16	0.09	0.09	0.08	0.12	0.03	0.09	0.03	0.09
11	0.24	0.26	0.09	0.06	0.07	0.04	0.02	0.02	0.07	0.13
12	0.24	0.28	0.18	0.02	0.02	0.06	0.0	0.06	0.04	0.09
13	0.20	0.34	0.26	0.10	0.0	0.0	0.04	0.04	0.02	0.0
14	0.19	0.23	0.13	0.13	0.03	0.04	0.02	0.05	0.10	0.09
15	0.22	0.21	0.14	0.04	0.06	0.09	0.05	0.08	0.08	0.02
16	0.26	0.23	0.22	0.05	0.0	0.07	0.0	0.04	0.02	0.11
17	0.28	0.18	0.12	0.03	0.06	0.07	0.08	0.04	0.09	0.04
18	0.25	0.25	0.19	0.01	0.01	0.03	0.12	0.01	0.10	0.04
19	0.18	0.36	0.18	0.04	0.04	0.06	0.01	0.06	0.04	0.05
20	0.20	0.16	0.12	0.01	0.01	0.11	0.06	0.16	0.12	0.06
21	0.19	0.17	0.16	0.07	0.0	0.07	0.01	0.13	0.11	0.09
22	0.19	0.27	0.14	0.07	0.06	0.05	0.0	0.01	0.0	0.21
23	0.20	0.22	0.17	0.03	0.02	0.11	0.01	0.04	0.05	0.15
24	0.28	0.20	0.14	0.05	0.0	0.08	0.02	0.08	0.03	0.11
25	0.19	0.33	0.12	0.06	0.01	0.01	0.07	0.04	0.09	0.07
26	0.25	0.30	0.22	0.04	0.02	0.03	0.04	0.06	0.04	0.01
27	0.20	0.31	0.10	0.12	0.02	0.08	0.0	0.04	0.06	0.08
28	0.24	0.23	0.22	0.02	0.03	0.10	0.05	0.01	0.02	0.06
29	0.24	0.24	0.23	0.07	0.01	0.05	0.04	0.06	0.04	0.03
30	0.13	0.32	0.12	0.10	0.01	0.06	0.0	0.12	0.07	0.07
31	0.25	0.23	0.19	0.03	0.03	0.04	0.04	0.04	0.06	0.09
32	0.28	0.12	0.05	0.03	0.05	0.09	0.10	0.09	0.15	0.04
33	0.20	0.19	0.13	0.06	0.0	0.09	0.15	0.06	0.06	0.07
34	0.17	0.10	0.15	0.02	0.08	0.12	0.03	0.10	0.07	0.07
35	0.12	0.26	0.07	0.16	0.0	0.09	0.02	0.09	0.07	0.12

and low minor physical anomalies with respect to incidence of behavior disorder as measured by the Preschool Behavior Questionnaire ($\alpha < .05$).

The hypothesis of differences between the groups was evaluated using the t-test for differences between independent means. Analysis of the data indicated no reason to reject the null hypothesis of no difference since $t(48) = .19$ for Total Behavior Disordered and was not significant. Table III presents the comparison of the performance of high and low anomalies groups on the Total Score of the Preschool Behavior Questionnaire (PBQ) and the three sub-categories of behavior identified by the PBQ.

General Hypothesis 2: It is hypothesized that the group of subjects with minor physical anomalies, and a history of obstetrical complications or a family history of learning and/or behavior problems has a significantly higher incidence of behavior disorders as measured by the Preschool Behavior Questionnaire than the subjects with low minor physical anomaly scores.

Operational Hypothesis 2: There is no significant difference between the means of the group of subjects with multiple anomalies and a history of obstetrical complications or family history of problems and the

TABLE III

t-Tests for Differences in Means Between Group with Low Newborn or One-Year Minor Physical Anomalies Scores (MPAs) and High Anomalies Scores on Preschool Behavior Questionnaire

	Group	N	Mean	Standard Deviation	t Value	df	2-Tail Prob.
NEWBORN							
Total Score	Low MPAs	25	6.5200	6.462	0.19	48	0.854
	High MPAs	25	6.2000	5.737			
Hostile-Aggressive	Low MPAs	25	1.4800	2.293	0.23	48	0.822
	High MPAs	25	1.3200	2.688			
Anxious	Low MPAs	25	1.7200	1.948	0.39	48	0.698
	High MPAs	25	1.5200	1.661			
Hyper-active	Low MPAs	25	2.1200	2.186	0.18	48	0.860
	High MPAs	25	2.0000	2.582			
ONE-YEAR							
Total Score	Low MPAs	23	5.6087	5.766	-0.81	48	0.423
	High MPAs	27	7.0000	6.318			
Hostile-Aggressive	Low MPAs	23	1.0870	1.905	-0.82	48	0.415
	High MPAs	27	1.6667	2.882			
Anxious	Low MPAs	23	1.5652	1.950	-0.20	48	0.844
	High MPAs	27	1.6667	1.687			
Hyper-active	Low MPAs	23	1.9130	2.109	-0.40	48	0.690
	High MPAs	27	2.1852	2.602			

No Significant Differences

group with low anomaly socres on the Preschool Behavior Questionnaire ($\alpha < .05$).

The hypothesis of differences between means of the groups was evaluated using the t-test for differences between independent means. Analysis of the data indicated no reason to reject the null hypothesis of no difference since $t(33) = .42$ (for high anomalies and obstetrical complications) and $t(27) = -0.81$ (for high anomalies and family history) and neither was significant.

Tests also were used to determine whether the combination of high anomaly score and a family history or obstetrical complications had a relationship to any of the three PBQ subscores. Both newborn and one-year anomaly scores were combined, first with family history and then with obstetrical complications. Statistical analyses evaluating the 16 relationships indicated three which were statistically significant:

1. Within the group of children who had both a high anomaly score at one year and a positive family history of learning and/or behavior problems, there was a significant association with Hostile-Aggressive behavior ($t = -1.90$, $N = 5$, $p = .034$).

2. Within the one-year high anomalies group, there was a significant relationship with a positive history of obstetrical complications and Hyperactivity ($t = -1.71$, $N = 10$, $p = .049$).

3. Within the group of children who had both a high newborn anomaly score and a positive history of obstetrical

complications, there was a significant relationship with Hostile-Aggressive behavior (t = 1.84, N = 10, p = .037). Tables IV and V presents the results of the analysis.

General Hypothesis 3: It is hypothesized that the group of two-year old subjects with multiple anomalies has a significantly higher incidence of disordered or delayed language development as measured by the Environmental Language Inventory or Developmental Sentence Analysis than the subjects with low minor physical anomaly scores.

Operational Hypothesis 3: There is no significant difference between the means of the groups of subjects with multiple and low anomalies with respect to incidence of language delay or disorder ($\alpha < .05$).

The hypothesis of differences between means for delayed language was tested using a t-test for differences between independent means. Analysis of the data indicated no reason to reject the null hypothesis as $t(48) = -.96$ (for delayed language) and was not significant. Table VI presents the analysis of the data for the t-test evaluating delayed language.

The hypothesis of differences between the high and low anomaly groups in terms of incidence of language disorders was evaluated by comparing the raw scores of each group using a

TABLE IV

t-Tests for Differences in Means Between Group with Low Newborn Minor Physical Anomalies (MPAs) Score and Group with High Newborn Anomalies Score with Obstetrical Complications (OB) or Family History (FAM) on Preschool Behavior Questionnaire

	Group	N	Mean	Standard Deviation	t Value	df	2-Tail Prob.
NEWBORN							
Total Score	Low MPAs	25	6.5200	6.462	0.42	33	0.680
	High MPAs + OB	10	5.6000	4.061			
Hostile-Aggressive	Low MPAs	25	1.4800	2.293	1.84	32.95	0.074*
	High MPAs + OB	10	0.5000	0.850			
Anxious	Low MPAs	25	1.7200	1.948	1.07	31.84	0.293
	High MPAs + OB	10	1.2000	0.919			
Hyper-active	Low MPAs	25	2.1200	2.186	-1.02	33	0.314
	High MPAs + OB	10	3.0000	2.582			
NEWBORN							
Total Score	Low MPAs	25	6.5200	6.462	-0.81	27	0.425
	High MPAs + FAM	4	9.2500	4.349			
Hostile-Aggressive	Low MPAs	25	1.4800	2.293	-1.47	23.67	0.153
	High MPAs + FAM	4	2.2500	0.500			
Anxious	Low MPAs	25	1.7200	1.948	-0.48	27	0.633
	High MPAs + FAM	4	2.2500	2.630			
Hyper-Active	Low MPAs	25	2.1200	2.186	-1.03	27	0.310
	High MPAs + FAM	4	3.5000	4.123			

*Significant at .05 level 1/

1/ When the 2-Tail probability is halved to take into account the hypothesized direction of the difference (a 1-Tail probability), then this result is significant.

TABLE V

t-Tests for Differences in Means Between Group with Low One-Year Minor Physical Anomalies (MPAs) Scores and Group with High One-Year Anomalies Score with Obstetrical Complications (OB) or Family History (FAM) on Preschool Behavior Questionnaire

	ONE-YEAR						
	Group	N	Mean	Standard Deviation	t Value	df	2-Tail Prob.
Total Score	Low MPAs	23	5.6087	5.766	-0.85	31	0.401
	High MPAs + OB	10	7.5000	6.125			
Hostile-Aggressive	Low MPAs	23	1.0870	1.905	-0.15	31	0.882
	High MPAs + OB	10	1.2000	2.201			
Anxious	Low MPAs	23	1.5652	1.950	0.13	30.21	0.899
	High MPAs + OB	10	1.5000	0.972			
Hyper-active	Low MPAs	23	1.9130	2.109	-1.71	31	0.098*
	High MPAs + OB	10	3.4000	2.716			
	ONE-YEAR						
Total Score	Low MPAs	23	5.6087	5.766	-1.60	26	0.121 1/
	High MPAs + FAM	5	10.0000	4.123			
Hostile-Aggressive	Low MPAs	23	1.0870	1.905	-1.90	26	0.068*
	High MPAs + FAM	5	2.8000	1.304			
Anxious	Low MPAs	23	1.5652	1.950	-1.03	26	0.310
	High MPAs + FAM	5	2.6000	2.408			
Hyper-active	Low MPAs	23	1.9130	2.109	-1.26	26	0.219
	High MPAs + FAM	5	3.4000	3.578			

*Significant at .05 level 1/

1/ When the 2-Tail probability is halved to take into account the hypothesized direction of the difference (a 1-Tail probability), then this result is significant.

TABLE VI

t-Tests for Differences in Means Between Group with Newborn and One-Year High Minor Physical Anomalies Scores (MPAs) and Low Anomalies Scores and Mean Length of Utterance (MLU)

	Group	N	Mean	Standard Deviation	t Value	df	2-Tail Prob.
NEWBORN							
MLU	Low MPAs	25	2.5670	1.149	-0.96	46	0.341
	High MPAs	23	2.9501	1.590			
ONE-YEAR							
MLU	Low MPAs	23	2.7311	1.227	-0.09	46	0.926
	High MPAs	25	2.7684	1.526			

No Significant Differences

listing of cases (LIST CASES) of the variables in question. Analysis of the data indicated no reason to reject the null hypothesis for the following reasons: (1) within the subgroup of subjects with high minor physical anomaly scores, only two subjects were identified as "language disorder" children. The two other children identified as language disordered had low anomaly scores. In addition, within the high anomaly group, only three children were identified as having "questionable language disorder", while the remaining four "questionable" children were in the low anomalies group. The raw scores used to analyze the relationship of disordered language development and anomalies are in the Appendices.

General Hypothesis 4: It is hypothesized that the group of subjects with multiple minor physical anomalies, and a history of obstetrical complications or family history of learning and/or behavior problems has a significantly higher incidence of delayed and disordered language than the subjects with low minor physical anomaly scores.

Operational Hypothesis 4: There is no significant difference between the groups with multiple anomaly scores and obstetrical or family problems and the group with low anomaly scores in incidence of language delays or disorders ($\alpha < .05$).

The hypothesis of differences between means for delayed language was tested using a t-test for differences between independent means. Analysis of the data indicated no reason to reject the null hypothesis since the $t(10.20) = -.91$ (for high anomalies and obstetrical complications) and $t(27) = .87$ (for high anomalies and family history). Neither was significant. Table VII presents the results of the data analyses.

Analysis of the data relevant to anomalies and selected variables and language disorder showed no significant difference between the groups and therefore indicated no reason to reject the null hypothesis. Specifically, the data analysis indicated only one child identified as language disordered to be a member of the subgroup of subjects with both a high anomaly score and a positive family history ($N = 5$). In addition, only two of the subjects identified as questionable language disordered were within the subgroup of children having both a high anomaly score and a positive family history. The subgroups of children who had both a high anomaly score and a history of obstetrical complications contained no children with language disorders. The raw scores used to analyze this hypothesis are located in the Appendices.

General hypothesis 5: It is hypothesized that there is a significant relationship between behavior disorders as measured by the Preschool Behavior Questionniare and language disorders and delays as measured by the Environmental Language

TABLE VII

t-Tests for Differences in Means Between Group with Newborn and One-Year Low Minor Physical Anomalies (MPAs) Score and Group with High Anomalies Score with Obstetrical Complications (OB) or Family History (FAM) and Mean Length of Utterance (MLU)

	Group	N	Mean	Standard Deviation	t Value	df	2-Tail Prob.
NEWBORN							
MLU	Low MPAs	25	2.5670	1.149	-0.91	10.20	0.384
	High MPAs + OB	10	3.4107	2.836			
NEWBORN							
MLU	Low MPAs	25	2.5670	1.149	0.87	27	0.390
	High MPAs + FAM	4	2.0479	0.621			
ONE-YEAR							
MLU	Low MPAs	23	2.7311	1.227	1.56	26	0.132
	High MPAs + FAM	5	1.8384	0.713			
ONE-YEAR							
MLU	Low MPAs	23	2.7311	1.227	0.89	30	0.379
	High MPAs + OB	9	2.2814	1.415			

No Significant Differences

Inventory and Developmental Sentence Analysis.

Operational Hypothesis 5: There is no significant relationship between behavior disorders and language delays or disorders ($\alpha < .05$).

The hypothesis for estimating the correlation of scores for delayed language was evaluated by using the Pearson product-moment coefficient of correlation. Analysis of the data indicated rejection of the null hypothesis because the correlation coefficient was $r = -.3978$ (for language delay) and was significant at the .003 level.

The hypothesis for estimating the relationship between behavior disorder and language disorder was evaluated by comparing the scores of subjects identified as both language and behavior disordered. The comparison was completed by analysis of the raw scores of the variables being evaluated. Analysis of the data indicated no reason to reject the null hypothesis of no difference because only one of the four disordered language subjects was behavior disordered (i.e., hyperactive). Within the subpopulation of subjects with questionable language disorders (N = 7), only one child was identified as hyperactive and a second child was rated as being behavior disordered on three of the possible four PBQ scores.

Summary of the Significant Findings

The present investigation was undertaken to determine if there is a higher incidence of behavior disorders or language differences in a group of two-year old subjects who

have multiple anomalies as compared to subjects with a low anomaly score. Analyses of the data collected indicated that an anomalies score alone did not predict those two-year old children who evidence behavior disorders or language differences.

The present study also investigated whether an anomaly score paired with selected family background variables are related to behavior disorders and language difference. Results indicated that a high newborn anomaly score combined with a positive history of maternal obstetrical complications is significantly associated with Hostile-Aggressive behavior at two years of age. A second significant finding is that a high anomaly score at one year combined with obstetrical complications significantly related to Hyperactive behavior at two years. A third significant finding is that a high one-year anomaly score combined with a positive family history of learning and/or behavior problems had a statistically significant relationship with two-year old Hostile-Aggressive behavior.

The final area of investigation of this study was to determine whether a relationship exists between language differences and behavior disorders of two-year old children. With respect to this area of investigation, it was found that language delay is significantly related to behavior disorder.

CHAPTER V

DISCUSSION AND IMPLICATIONS

This study is designed to provide evidence concerning the usefulness of a screening device for the early identification of children who are at risk of becoming behavior disordered or language different. Especially, it is designed to determine whether there is a higher incidence of behavior disorders or language differences in a group of two-year old subjects who have high minor physical anomaly scores as compared to a group with low anomaly scores. A secondary purpose of this study is to determine whether there exists a significant relationship between disorders in behavior and differences in language development of selected two-year old subjects.

This chapter first discusses results of the data analyses pertaining to each of the five hypotheses and certain conclusions which seem to be reasonably inferred from the assembled data. The latter portion of this chapter discusses the principal implications of the findings with respect to: early identification of at risk infants, minor physical anomalies as an early indicator of later developmental delays and disorders, behavior disorders of preschool children, language differences among young children, and the relationship of behavior disorders and language differences.

In any study of this sort, data are generated which lead to findings which are outside the scope of the hypotheses. Additional findings of interest flowing from the present investigation are summarized in Appendix I.

Hypothesis One

The independent variable in this study is the incidence of minor physical anomalies (MPAs). MPA scores for each subject in the present investigation were determined at the Georgetown Univerity Hospital at birth and at one-year of age. The dependent variable, behavior disorder, was measured by the Preschool Behavior Questionnaire (PBQ) during home visits. Means of the groups of children with high and low anomalies were compared with the Total PBQ score as well as the Hostile-Aggressive, Anxious, and Hyperactive sub-category scores of the PBQ.

Statistical analysis of data obtained from the sample in the present study indicated that the incidence of multiple anomalies at birth or at one year of age was not related to behavior disorders as identified by the Preschool Behavior Questionnaire. The *t*-test scores indicated no reason to reject the null hypothesis of no difference.

Numerous studies have been performed to investigate the relationship between behavior disorders (particularly hyperactive behavior) and incidence of minor physical anomalies (See Chapter II, pages 24-30). These investigations have reported significant relationships between number of anomalies and both teacher rating and clinical observation of hyperactive and other behavior disorders. These studies have first identified elementary school children who were rated as being behavior disordered and then screened for the presence of anomalies. The present investigation, on the other hand, investigated whether those children who are identified at birth to have multiple

anomalies exhibited behavior disorders at two-years of age.

The question this study addresses is: will a group of infants identified as having multiple anomalies develop behavior disorders which are observable and measurable during their early childhood years. The results of this investigation indicate that incidence of anomalies is not significantly associated with behavior disorders at two years of age.

Hypothesis Two

Hypothesis 2 tested whether the combination of a high anomaly score and a positive family history of behavior and/or learning problems or a history of obstetrical complications bore a relationship to any of the four PBQ behavior scores. Statistical analysis evaluating the 16 possible relationships indicated that three were statistically significant. First, there was a significant relationship between high anomaly scores at one-year combined with a positive family history and Hostile-Aggressive behavior. The second significant relationship was between one-year anomaly scores combined with a positive history of obstetrical complications and Hyperactivity. The third significant relationship was between high newborn anomaly scores combined with a positive history of obstetrical complications and Hostile-Aggressive behavior.

Although the third relationship is significant, it is in the opposite direction from that hypothesized. In addition to these three significant findings, a cursory review of the sixteen pairs of means obtained from testing Hypothesis II (See Tables IV and V) indicates that the direction of the means is as

expected. It is possible that larger sample sizes might produce statistically significant differences between the means. Judgments based upon sample sizes of four to ten must be made with due caution and appropriate qualification.

Quinn and Rapoport (1974) reported that boys who had a high anomalies score and who were identified as hyperactive, were more likely to have had an early onset of hyperactivity (before age three) as well as either a paternal history of hyperactivity or a maternal history of obstetrical complications. In addition, the one-year clinical evaluation of subjects used in the present investigation (N = 116) found a significant positive correlation between those children who were reported as irritable and/or hyperactive by their mothers and the combination of high anomalies and obstetrical complication or a family history of problems (Quinn et al., 1977).

This investigation, however, does not support with statistically significant findings the relationship between anomalies combined with obstetrical complications or a family history of problems and behavior disorders. Nevertheless, the fact that three of the 16 pairs of means were significantly different and the fact that most of the other group means were in the expected direction indicates that further investigation of this hypothesis is warranted. A larger sample size of children who possess the combined variables might produce statistically significant differences between the group means.

Hypothesis Three

Hypothesis 3 tested the relationship between the incidence of minor physical anomalies and language delay and disorder. Statistical analysis of the sample data indicated that the incidence of minor physical anomalies was not significantly related to differences in language development. There was no evidence to support rejection of the null hypothesis of no difference between high and low anomaly groups for delayed or disordered language.

Among the numerous studies investigating the presence of anomalies in children, several have found a relationship between anomalies and language or learning problems. If presence of anomalies could predict language differences at two-years of age, they may also be a valuable indicator of children who are at risk of school problems. However, the results of this investigation indicate that anomalies are not significantly associated with language delay or disorder at age two years.

Hypothesis Four

Hypothesis 4 was tested to determine whether multiple anomalies in combination with a positive family history or with obstetrical complications was a determinant of language differences at two-years of age. None of the four tests - newborn and one-year anomalies scores each combined with both obstetrical complications and with a positive family history - indicated significant differences between the means of the two groups. However, a review of the means obtained from testing Hypothesis

4 indicates that the direction of the means is as expected.

An additional analysis was completed to determine whether a relationship existed between incidence of anomalies combined with the selected variables and language disorder. No differences were found between the groups.

Recent studies have found that elementary school children with language and learning problems have significantly more anomalies than their peers with no identified problems. Additional studies have indicated that multiple anomalies combined with selected background data may be a better indicator of children at risk of developmental disorders. This investigation does not support with statistically significant findings the relationship between anomalies combined with obstetrical complications or with a positive family history and language differences at two years of age. However, because most of the group means were in the expected direction, this is an area deserving further investigation. Again, judgments based on such a limited sample size must be made with an appropriate degree of caution.

Hypothesis Five

This hypothesis investigated whether there is a relationship between behavior disorders and language differences. Several statistically significant relationships were found. The correlation between the PBQ Total score and MLU was moderately low ($r = -.3978$) but significant at the .003 level. The Hostile-Aggressive score, a sub-category of the PBQ, was not correlated with language delay. MLU and the PBQ Anxious behavior

score was moderately correlated (r = .4878) at the .001 level. A low (r = -.2521) but significant (p = .042) correlation was found between MLU and Hyperactivity as measured by the Preschool Behavior Questionnaire. These results indicate that delayed language, i.e., shorter MLUs, is significantly related to behavior disorders. No such relationship was found between language disorder (N = 4) and behavior disorder.

Results of the present investigation indicate that the subgroups of children who were perceived as overall behavior disordered, anxious, and hyperactive have a higher incidence of delayed language than their non-behavior disordered peers. There is much support in the literature for the statistically significant relationship between behavior disorders and language delays found in the present study. The direction of the influence is unknown. Most of the studies reporting a relationship between language and behavior disorders have focused on elementary school children. Problems in language and behavior are often cited as characteristics of learning disabled children (Stevens, 1976). Little is known about preschool children with early language differences and behavior disorders. Therefore, the significance of the results of the present study lies within its findings that children as young as two years can be identified as evidencing both of these developmental problems.

Implications of Findings

The following discussion focuses on the implications of this study with respect to the areas addressed in the literature review of Chapter II: the need for early identification, screening

for anomalies as an indicator of later developmental delays and disorders, the behavior disorders of young children, and the language development of preschool children. Also included is a discussion concerning the relationship of language and other behavior.

The present study represents a one-time sampling, albeit a sophisticated and structured one, of the langauge and behavior development of young children. A research design of this type does not permit an investigator to observe and record the patterns and pervasiveness of behaviors. Rather, a design, such as that used in the present study, notes developmental trends and relationships at a given point in time. A comprehensive developmental assessment of a child requires an ongoing process. Such a procedure, however, is beyond the scope of the present investigation.

Need for Early Identification

This investigation was begun with hypotheses which assumed the value of early identification and intervention for at risk children. This assumption presupposed the ability to identify, at a very early age, those children whose language and other behavior was developing in a manner which could be considered delayed or disordered. These assumptions, however, have been challenged and undermined by the most recent literature, by evidence accumulated during the process of data collection fcr this study, and by the results of this study.

When the present study was conceptualized in mid-1976, the value of early detection and intervention for developmental delays and disorders seemed self-evident. As this study

progressed, and as the present investigator more critically reviewed the older literature and reviewed the most recent studies, it became evident that empirical studies concerning early identification and treatment of children with behavior disorders or language differences are controversial and inconclusive. Indeed, there is substantial lack of agreement in the literature concerning how disorders in behavior and differences in language development can be defined, identified, and treated.

The identification of children who have "low incidence"[1/] handicapping conditions is easily accomplished very early in life - often at birth. Children with severe sensory deficits, physical disabilities, or who are severely and profoundly retarded can, and should be, evaluated and provided with appropriate programming as early as infancy. Such conditions are known to be cumulative in their debilitating effect upon the child. It is usually agreed that such severe conditions are most amenable to very early and continued intervention.

Our present ability to identify and treat children who have or are at risk of such "high incidence" exceptionalities as behavior problems and language/learning disabilities during their infancy or early childhood is limited. Indeed, there is little agreement as to what constitutes a behavior disorder or language difference for a child who is two years of age. This lack of agreement is partially due to the limited number of

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1/ The categories high and low incidence are clinical terms indicating the prevalence of handicapping conditions.

empirical studies concerning early disorders in behavior and differences in language development. Undoubtedly, public demand for appropriate preschool services will influence researchers to pursue these areas. Nevertheless, intervention for two-year old children who are suspected of having "high incidence" exceptionalities is still open to debate.

Minor Physical Anomalies

Multiple minor physical anomalies present at birth are considered to be congenital, anatomical deviations that may be used as indicators of a "fetal maldevelopment" (Rapoport and Quinn, 1976). They may reflect minor prenatal developmental defects of the central nervous system which, in turn, may result in genetically determined developmental delays or disorders. The present study investigated in some depth the social-behavioral development and expressive language of two-year old children who had been screened at birth for anomalies. Incidence of anomalies was not found to have a statisticaly significant relationship to either of these developmental areas. Results pointed to the heterogeneity of the study sample. On both measures of behavior disorder and of language differences, high and low anomalies groups did not differ.

There are several possible explanations for the lack of significant relationships between anomalies and the developmental variables. The first possible explanation is that the presence of multiple anomalies early in life may be an indicator of children who will have problems in developmental areas other than behavior and language. For example, children with high

anomaly scores may later have perceptual-motor disorders. Such disorders would not be detected by the methods and procedures used in this study.

A second possible explanation is that, while elementary school age children with selected developmental disorders have significantly more anomalies than their peers who have no identified disorders, it is not the case that children born with multiple anomalies have more developmental disorders at age two. The relationship between anomalies and developmental disorders may be only unidirectional. That is, while studies have found that children with behavior disorders have significantly more anomalies, children with high anomaly scores do not necessarily have behavior disorders.

A third possibility is that, although anomalies may be an early indicator of children who are at risk for later developmental disorders, developmental disorders are not observable and measureable at age two-years. The last decade has provided voluminous opinions and data concerning the first few years of life. There is general agreement in the literature concerning the sequence of early development and major milestones; yet, most scholars also agree that the variability of early acquisition and mastery of developmental abilities is substantial. With the recognition of so much variability, it is very difficult (and perhaps impossible) to definitively identify young children with those developmental disorders and differences which will

interfere with later school and life success. [1] If this third explanation is correct, then only by completing annual clinical and/or home evaluations (until at least primary school age) could it be determined at what age anomalies and developmental problems are related.

A fourth possible explanation for the lack of relationship in this study between anomalies and developmental delays and disorders is that positive environmental factors negated the predictive abilities of anomalies. Our current knowledge of the complex relationship of biological and environmental influences upon development permits such speculation.

All of the children in the present sample were white and were from intact families living in the metropolitan Washington area. Almost all lived in "middle-class" [2] neighborhoods and had professional fathers. Almost all of the subjects' mothers were fulfilling the primary caregiving role. Many were first, and often only, children. Each of these factors affects the development of children. At least superficially, the present sample was composed of advantaged two-year old children. The interaction of such positive environmental factors with the child's biological characteristics and predispositions, including the prenatal factors which are evident in the incidence of anomalies, may affect the child's observable and measurable behavior and ability.

1/ This statement does not indicate that blind, deaf, physically handicapped, severely and profoundly retarded, etc. children can and/or should not be identified and treated during infancy.

2/ As perceived by the present investigator.

Current information is inadequate to permit explanation of why the present study did not find a significant relationship between incidence of anomalies and behavior disorders or language differences. Only continued investigation of the present sample and replication studies will enable us to understand the relationship between minor physical anomalies and development. 1/

Behavior Disorders of Young Children

The findings of the present study include: (1) a statistically significant relationship between behavior disorders and language delay, and (2) no significant relationship between anomalies and behavior disorders. The identification of children who were behavior disordered was accomplished by rating their observed behaviors on the Preschool Behavior Questionnaire (PBQ). The PBQ was selected for this study as the best of the currently available instruments designed to evaluate the behavior of young children. While all of the available behavior rating instruments have limitations, the PBQ was evaluated as the most appropriate for the age of the sample, purpose of the study, and for use during home observations.

The PBQ permits an observer to rate a specified number of behaviors, all of which are usually considered to be negative, undesirable, or disordered. The PBQ does not permit the observer to make any ratings concerning a child's appropriate or acceptable behavior. These characteristics are

1/ Drs. Quinn and Rapoport are currently following a second group of children who were born and screened for anomalies at the Georgetown University Hospital. The children in the replication sample are one year younger than the children in the present investigation.

typical limitations of most behavior rating scales. Moreover, no behavior rating instrument includes all possible behaviors which may be categorized as disordered. Some subjects of the present investigation might have received a higher score if additional items permitted the identification of those children who are skillful manipulators or who are socially withdrawn. For example, one subject in the sample appeared to be totally lethargic and absent of any curiousity about people or objects in his environment. His behavior was troubling and the present investigator considered him to be behavior disordered. However, no provision is included on the PBQ to identify such behaviors and he was, accordingly, not rated as behavior disordered.

Another factor which influences the data concerning incidence of behavior disorders is the rating skill of the observer. The present investigator rated very few children as behavior disordered. The ratings completed during this study are significantly lower than those completed by teachers of both normal and deviant preschool children comprising the normative sample for the PBQ (See Appendix D for normative sample scores). The ratings completed during this study may be explained by any of the following:

1. The present sample has significantly fewer behavior disorders than the general population;

2. The age of the sample made the PBQ an inaccurate tool;

3. Two-years of age is too early for effective identification of behavior disordered children;

4. The present investigator is a trained professional in special education who may view many of the actions of young children as normal to a greater degree than other investigators; or

5. Behavior observed during the home visits was not representative of the children's behavior.

With respect to the first possibility, there is no reason to assume that the group of 50 children comprising the sample would have any more or less disordered behavior than other children of the same age. In fact, the group was chosen from the highest and lowest 25% of the sample with respect to the Behavior Problem Score received during the two-year clinical evaluation.

The Preschool Behavior Questionnaire (PBQ) was developed for, and normed on, children ages three to six years. Almost none of the available instruments have normative data for two-year old subjects. Although it is possible that the PBQ is not an accurate tool to effectively identify two-year old children with behavior disorders, the present investigator found that, in most cases, the PBQ items sufficiently permitted behaviors subjectively considered to be disordered to be so rated. Any additional items which the present investigator might consider as indicative of behavior disorder would not be age-related.

With respect to the third explanation, there are conflicting opinions concerning the ability to identify the very young child as behavior disordered. The available empirical data are controversial and inconclusive. The present

investigator believes that it is possible to accurately identify the child whose disordered behavior is extreme and pervasive as early as age two. The disordered behavior of the young child can be differentiated by its greater intensity, frequency, and persistence. The young behavior disordered child's behavior is seen by most observers, including experienced professionals in such fields as child development, special education, and child psychology, as "different".

The ability to identify a child at two-years of age as behavior disordered does not assure that the child will be behavior disordered in the future. Current knowledge is not sufficiently comprehensive to enable us to understand which characteristics of young children with disordered behavior are associated with significant impairment of later academic and social functioning. Indeed, Coleman and associates (1977) found that early behavior disorders reported by parents have no prognostic implications for the child's later school behavior. Only when we have more conclusive information concerning the patterns and persistence of the behavior disorders of young children can we make intelligent decisions concerning the need for and appropriate types of intervention.

Identification whether accurate or not can also lead to "labeling". The application of the diagnostic label "behavior disorder" may have serious consequences for the child. The labeled child may become selectively reinforced for any behaviors that have been associated with the term and may be internalized by the young child in his or her own behavior

expectations and, thereby, become a "self-validating hypothesis" (Cole and Moore, 1976).

The fourth possible explanation is that the present investigator, who is a special educator, may view the actions of young children as normal to a greater degree than other investigators. The observer who has had professional experience working with a wide range of preschool children is better able to identify those youngsters whose behavior is truly disordered than is the non-professional or less experienced observer. Study of, and intimate interaction with both children who are developing "normally" in the social-behavior domain as well as those identified as behavior disordered gives the observer sufficient experience to more accurately determine whether a child's behavior is disordered. The present investigator's wide range of professional experience with both normal and exceptional children, which includes experience with schools specifically designed for behavior disordered children, has prepared her to be a careful and accurate observer of children.

With respect to the possibility that observed behavior was not representative, several recent investigations have examined whether young children's behavior is predictable between situations and over time. Their findings are inconclusive. While there is little controversy over the fact that adults choose different behaviors and roles for different circumstances, the possibility that preschool children have the social skills to do the same is not widely accepted. It is possible that the home behavior of the subjects in the present

investigation differed from the behavior or roles chosen for other situations. It is equally possible that the observed behavior of the children is typical of their behavior in general.

There is considerable support in the literature for observing and rating behavior in the most natural setting. Direct observation in the homes of the subjects was the "most natural" choice for two-year old children. In the opinion of the present investigator, this choice of methodology provided immediate, first-hand data which was the most likely to reflect the normally occurring behavior of the young child. The use of a structured observation tool and the present investigator's professional experience, together with the choice of a naturalistic setting provides support for the accuracy of the data collected for the purposes of this study.

Language Differences of Young Children

Controversy concerning the definition, identification, and assessment of early language differences is striking. At the onset of this study, the present investigator used the terms "language delay" and "disorder" in an attempt to describe children who were using immature language or who were using bizarrely patterned word combinations. After reviewing literature which became available only after this study had begun, it became apparent that these imprecise definitions were inadequate for the task of operationally identifying children with problems in the development of language.

The three categories of language problems used in this

study - difference, delay, and disorder (see page 5) - were adopted late in the course of the present study. They are, moreover, used with caution. This investigation identified 13 two-year old children as language delayed and four as language disordered. This means that 17 of the 48 (or one-third) of the subjects are being considered language different. This figure seems inordinately high. To consider that one-third of a population is language different indicates either that: (1) the sample has an unusual number of problems, (2) the instruments or procedures used were inappropriate, (3) the language sample recorded was not representative of the child's language abilities, or (4) it may be impossible to identify in any effective way language delays or disorders among two-year old children with the measurement tools currently available.

With respect to the first possible explanation, it is most unlikely that the present sample has more language differences than their peers. As indicated earlier in this chapter, the sample of the present study is a group of advantaged two year old subjects. The environmental factors common to the sample are those commonly considered to be positive influences upon language development. Consequently, this group of children might be expected to have advanced or "exceptionally good" language skills.

The second possible explanation seems equally unlikely. Although there is considerable uncertainty at the present time both about the strategy and the tactics of language assessment, mean length of utterance (MLU) is a sensitive index of early

language development (Lahey and Bloom, 1978; Mittler, 1974). Brown (1973) states that as the many components of language emerge and are mastered, they all have the common effect of increasing the utterance length. Hence, the choice of analyzing language samples to determine the MLU for each subject is probably the most reasonable procedure for comparing the language development of two-year old subjects.

The third possible explanation for the number of children identified as language different, leads back to the procedures and methods selected for the study. Mittler (1976) states that the "cardinal problem in testing" is determining what relationship exists between the child's performance during the evaluation and what he or she does under other circumstances. All formal language assessment instruments suffer from the limitation of placing the child in a structured situation where he or she is required to respond in a certain way to standardized directions. But, young children are not always amenable to these structured evaluation situations, even when they involve a familiar person.

This problem can best be overcome by observation and recording of language in "real life" situations (Lahey and Bloom, 1978; Mittler, 1976). Hence, the procedures selected for this study utilize this method of data collection.

Our current ability to identify two-year old children with language differences is limited. All language clinicians and scholars would agree that the two-year old child with no intelligible utterances is language delayed. Two such children

were among the sample of this study. Because adequate normative data are available to expect that most two-year old children will be using utterances of at least two words, most language clinicians and scholars would agree that two-year old children using mostly one word utterances could be considered language delayed. Eleven such children were part of the present study. Recent research indicates that early language acquisition can be analyzed by observing the quality and type of semantic-grammatical rules employed in children's speech. By analyzing the number and type of semantic-grammatical rules in the subjects' recorded language sample, four additional children were identified as being language disordered.

However, to identify a child at two-years of age as language different does not guarantee that the child will continue to be language different - particularly if the difference can be categorized as delayed. Current knowledge is not sufficiently comprehensive to enable us to identify which characteristics of young children with language differences are associated with later problems in learning and social functioning. The great variety in language ability among two-year old children has been noted by all language researchers and clinicians. This is a period of striking differences among children. Results of the present study reaffirm the observation of Cazden and her associates (1972) that "at age 2 1/2 many children are talking a great deal while others do not utter a word" (p. 84).

The review of the relevant literature and the results

of the present investigation are in agreement as to the difficulties involved in defining and measuring early differences in language development. The findings of this study expand the available empirical data necessary to enable the accurate identification and assessment of early language differences.

Behavior Disorders and Language Difference

Analysis of the data collected during the present investigation indicated that delayed language development and behavior disorders were significantly related, a finding which has received much support in recent years from both expert opinion and empirical data. There is little understanding expressed in the literature as to whether one of these two developmental problems is causative of the other. It is possible that young children who are developing language at a slower rate than their peers are so frustrated in their inability to effectively communicate that they become behavior disordered. It is also possible, however, that the behavior disorders of young children interfere with their ability to develop age-expected language.

There is yet another possible explanation. An independent variable may explain the occurrence of both behavior disorders and language differences. Environmental factors, brain damage, or early developmental deviation in the central nervous system (CNS) may be such an influencing variable. Each has been reported in the literature as a possible cause of developmental problems (Conners, 1977; Wender, 1971).

Limited empirical data are available concerning the preschool child evidencing problems in both behavior and

language development. 1/ This lack of established knowledge complicates the drawing of conclusions and inferences from the findings of the present study. In late 1978, Stevenson and Richman (In Press) will publish the results of their investigation of the relationship between the language development and behavior disorders of three-year old children. The results of their investigation of 705 children indicates a strong relationship between behavior disorders and language development. The prevalence of behavior disorders in the total population was found to be 14.3% and in children with language delay to be 59.1%. Similarly, the rates of language delay in the total population and in children with behavior disorders were 3.1% and 12.9% respectively (Richman and Graham, personal correspondence).

Regardless of the causes, a preschool child who has both a language difference and disordered behavior is doubly at risk of later educational disabilities. Students with this combination of conditions can be expected to have problems interacting with peers, teachers, curricula, and/or materials within the school setting (Rubin and Balow, 1971). Stevens (1977) has suggested that 10% of some school populations may be considered to have both learning and behavior disorders. No such estimates, however, are available concerning the preschool population.

The present study found a significant relationship between behavior disorders and language delays of two-year old children. This finding is of sufficient significance as to

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1/ There is a large body of information concerning elementary school children with behavior disorders and language differences.

warrant further research. Early identification and intervention for children with language and behavior disorders may be effective in mitigating later educational failure, behavior problems, and psychological maladjustment.

Summarizing Comments

The purpose of this study was to provide evidence concerning the value of newborn screening for anomalies as an early indicator of children at risk of language differences and behavior disorders. While minor physical anomalies are readily identifiable and stable over time, language difference and behavior disorders can not be so readily and satisfactorily identified. The present investigation did not find statistically significant relationships between anomalies identified during infancy, alone or combined with background factors, and selected developmental variables at two-years of age. These results may be a reflection of the difficulties in our current ability to identify at an early age those children who have behavior disorders and language differences. The instruments currently available to diagnose disordered behavior and language differences are limited in their ability to evaluate the preschool child. Our knowledge of either normal or disordered development during the infancy and preschool period is not yet sufficiently comprehensive or refined to enable us to determine which early, developmental problems will persist or adversely effect other areas of development.

The results of this study do not support a relationship between anomalies and developmental delays or disorders in

selected two-year olds. Follow-up study of the present subjects (as they attend kindergarten and elementary school) would provide the additional information necessary to determine whether anomalies and educational difficulties were related for this sample. Replication studies using other measurements of development and larger sample sizes would further test the usefulness of early screening for minor physical anomalies to identify infants who are at risk of developing behavior disorders or language differences. The present investigation provides empirical data useful to the ongoing process of determining what factors are useful in identifying at risk infants and children.

Sufficient data should be collected, interpreted, and integrated with our current understanding concerning early developmental deviations. More investigations, such as the present one, should be implemented to identify those factors (both environmental and biological) that characterize or shape early disordered development. Only then will we be able to identify with assurance those infants who are at risk of developmental disorders and delays and enable the establishment of preventive or ameliorative early intervention programs.

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APPENDIX A

LIST OF ANOMALIES AND SCORING WEIGHTS

Anomaly	Weight
HEAD	
Fine electric hair:	
Very fine hair that will not comb down	2
Fine hair that is soon awry after combing	1
Two or more hair whorls	0
Head circumference outside normal range:	
1.5	2
1.0 = 1.5	1
EYES	
Epicanthus:	
Where upper and lower lids join the nose, point of union is:	
Deeply covered	2
Partly covered	1
Hypertcliorism:	
Approximate distance between tear ducts:	
1.5	2
1.0 = 1.5	1
EARS	
Low-seated ears:	
Point where ear joins the head not in line with corner of eye and nose bridge:	
Lower by 0.5 cm.	2
Lower by =0.5 cm.	1
Adherent ear lobes:	
Lower edge of ears extend:	
Upward and back toward crown of head	2
Straight back toward rear of neck	1
Malformed ears	1
Asymmetrical ears	1
Soft and pliable ears	0
MOUTH	
High-steepled palate:	
Roof of mouth:	
Definitely steepled	2
Flat and narrow at the top	1
Furrowed tongue (one with deep ridges)	1
Tongue with smooth-rough spots	0
HANDS	
Curved fifth finger:	
Markedly curved inward toward other fingers	2
Slightly curved inward toward other fingers	1
Single transverse palmar crease	1
FEET	
Third toe longer than second:	
Definitely longer than second toe	2
Appears equal in length to second toe	1
Partial syndactylia of two middle toes	1
Big gap between first and second toes	1

APPENDIX B

I. Agent + Action (AA)

This rule states that when a child expresses an action being made by a person or thing (agent), the action word follows the word for the agent. The agent may include someone or something, usually animate, which is perceived to have its own motivating force and to cause an action or process (Chafe, 1970). Most agents are animate ("mommy," "I," "you," "doggie") but a few are not, such as the first word in the expression "car go." Words for the action function involve perceived movements as expressed in terms such as "push," "take," "write," "stand up,", and "go." Brown (1973, p. 193) reports strong evidence for the Agent + Action rule in the earliest sentences of several languages. MacDonald, et al., (1974b) reports that Agent + Action was one of the three most frequent rules in the conversational speech of 25 normal preschool children. The finding held across five age groups from two to four and a half years. Examples of the rule are: "Bambi go," "mail come," and "daddy throw."

II. Action + Objection (AO)

When a child states that an action is made upon a direct object, the action word precedes the object word. Brown (1973) defines the object in this relation as someone or something either undergoing a change of state or simply receiving the force of an action. The object may be the name of a person or thing or a pronoun, such as "it" or "that." Brown (1973), p. 193) reports occurrences of the rule in French, German, Korean, and Luo languages as well as in English. MacDonald, et al., (1974b) reports that Action + Object was one of the three most frequent rules in the speech of 25 preschool children. Examples of the Action + Object rule include: "see sock,", "want more," "push car," and "chew it."

III. Agent + Object (AgO)

When careful account of the context was taken in analyzing early utterances, Bloom (1970) found occasional cases of an agent preceding a direct object without the action word linking the two. While this two word combination is not observed in adult speech and is reported by Brown as only of marginal occurrence in reports of child speech, the interesting use of a semantic or contextual approach to analyses of grammar may reveal greater occurrence than has been usually reported. Brown (1973, p. 194) suggests that the Agent + Object construction may constitute a semantic relational unit as in the case of a child kicking a ball ("boy ball") or turning a key ("boy key") wherein the agent and object seem to be in direct interaction. This position rule is a striking example of the essential role the context may play in identifying the semantic relations (or meaning) of a given grammatical structure. MacDonald, et al., (1974b) reports Agent + Object to be the

fourth most frequent of eight rules in 25 preschoolers' language. They also found this rule to increase in frequency as utterance length increased. Thus, Agent + Object may be an artifact of utterances longer than two words.

Examples of the Agent + Object rule are "Eve lunch" (as when Eve is having lunch) and "mommy sandwich" (as when mommy is about to have a sandwich), (Brown and Bellugi, 1964).

Modifier + Head (INTRODUCTION)

The Modifier + Head specifies that when one word of the utterance modifies the other, the word doing the modifying (modifier) precedes the word it modifies (Head). Several reports of the distribution of early child utterances (Brown, 1973) reveal three major classes of modifiers which the child and we must learn to distinguish. The three classes of modifiers are attribution ("pretty boat," "big boy"), possession ("daddy chair," "my car"), and recurrence ("more book," "more read," "mother coke"). Again, as in the case of Negation + X, Schlesinger does not formally state the semantic distinctions within the rule but does include these distinctions in his examples of the rule. Knowledge of the context is necessary to reveal which modifier class expresses the meaning ofcertain utterances. For example, "baby book" may be a statement of possession (whose book?) or one of attribution (what kind of book?). The present form of the ELI assesses the three following categories of the Modifier + Head rule separately.

IV. Modifier + Head (Possession) (MHP)

Statements of possession occur with high frequency and productivity (as evidenced by use in novel situations) in the early speech of several languages. This high occurrence may reflect in children primitive notions of property and territoriality (Brown, 1973, p. 195). Consequently, the distinction of possession as a separate semantic class within the rule Modifier + Head may be useful for both diagnostic and training purposes. Examples include "my ball" and "daddy car".

V. Modifier + Head (Recurrence) (MHR)

As in the case of possession, two-word utterances reflecting the semantic relation of recurrence appear to operate with sufficient frequency and independence for them to merit separate classification under the rule Modifier + Head. Early statements of recurrence have different meanings in different cases. A word for recurrence may mean the reappearance of a referent. The word indicating recurrence is usually "more" or "another" and the rule states that it occurs prior to the thing or action which is to recur. Bloom (1970) found no semantic distinction between children's use of "more" or "another" though "another" was not used before action words.

The second word in two-word expressions of recurrence is usually a noun ("more milk") or verb ("more push"). Brown (1973, p. 190) reports that the case for the "universality" of recurrence in the first sentences is fairly strong; evidence is available for use of the rule in the earliest sentences in German, French and Korean.

VI. Modifier + Head (Attribution) (MHA)

The rule specifying the position of the modifier before the word modified may be influences by the fact that, in adult English, this position rule is hard and fast. However, reports from several languages including English report the reverse order in early sentences of children. For example, while many children make descriptive statements such as "pretty boat" and "big car," it is not uncommon in several languages to find descriptions such as "doggie tired" and "carriage broken." Finding both orders in early speech is not surprising since many languages (including English) exhibit both the prenominal adjective ("yellow block") and the predicate adjective ("The block is yellow"). Thus, the rule specifying that the modifier precedes the word modified may be most useful in directing the child to the desired adult position form when only two words are used for description. In addition, it should be noted that children do not restrict their modifiers to adjectives (as adults usually do) but frequently nouns and other structures (as in "mommy doll," meaning the dolly that is a mommy and not the doll that belongs to mommy).

VII. Negation + X (NX)

Schlesinger's position rule for negation states that the word implying negation precedes the undetermined word class (X) for the referent that is in some way being negated. Schlesinger offers the following examples: "no wash," "no water," "no down," "no mama," and "allgone shoe." According to Bloom's (1970) findings, in early language development children apply the single negation rule to communicate three distinct meanings -- non-existence, denial and rejection. While Schlesinger does not make these distinctions formally, his examples of the rule do include the three semantic intentions.

(a) Non-existence. In "non-existence" the referent is not manifest in the context and there is no expectation of its existence. Often the missing referent has been present in the recent past. Forms expressing this meaning include "no more" and allgone" as in "no more juice" and "allgone magazine."

(b) Rejection. In "rejection" the referent is present or imminent and is rejected or opposed by the child. For example, Bloom (1970) reports that one of her subjects, Kathryn, said "no dirty soap" as she pushed away a sliver of worn soap. Other examples may include "no soup" and "no outside"

to express the apparent intentions of rejecting a bowl of soup or an invitation to go outside.

(c) Denial. In "denial" the child makes an utterance denying that an actual or supposed assertion was the case. For example, if a mother gives her child a gingerbread man and says "Here's a cookie," the child might reply "no cookie" indicating his denial of the mother's label of the treat. Thus, it is recommended that while the same position rule, Negation + X holds for most statements of negation, the semantic functions of the rule should be separated into non-existence, rejection and denial for diagnosis and training. Future research may reveal differences among the negative functions in terms of their development and susceptibility to training.

VIII. X + Locative (XL-AO)

IX. X + Locative (XL-ACT)

When children use a word indicating where something is located or where an action takes place, the rule governing such relations states that such a word is usually placed in the second position. Thus, in this rule, the term "X" generally refers to an entity (thing or person) or an action but could take a range of traditional grammatical roles. The locative is generally expressed with a noun or adverb (for example, "ball room," "baby chair," "throw here," "put there"). The context of the utterance must generally be observed to clearly determine the functional relation intended.

Brown's survey of studies of several languages (1973, p. 194-5) suggests two major categories for the X + Locative rule: Action + Locative ("walks street" and "throw here") and Entity (usually a noun) + Locative ("lady home" and "bottle here"). MacDonald, et al., (1974b) found that where both types of the X + Locative rule were assessed as one, it was among the three most frequent rules in all five age groups of the 25 normal preschoolers. Note that in the present form of the ELI X + Locative is tested in two ways: X (Agent or Object) + Locative (XL-AO) when X is an agent or object (Brown's Entity) and X (Action + Locative) when X is an action word.

X. Introducer + X

When children take notice of an object or part of their environment, they often express this attention with an introducer word (such as "this," "here," "see") preceding the word for the referent being noticed. The rule Introducer + X takes account of two of Brown's (1970) first sentence types Nomination (e.g., that book) and Notice (e.g., hi belt). Braine (1971) uses the term ostensive sentence for an utterance used to identify names, objects, etc. Miller and Ervin (1964) have observed children use this rule in what they call demonstrative sentences.

Any word that serves a simple naming function may be the introducer. The most common introducer reported across several languages (Brown, 1973) are: "this," "that," "here," "there," "it," "see," and "s." The word for X may be of any grammatical class that is the object of notice. Thus X refers usually to a referent that has been pointed at, looked at, or picked up. Consequently in this rule X will usually be in the form of a noun, but words for quantities and qualities have also been reported (as in the case of "that blue" and "here more;" Schlesinger, 1971).

Brown (1973) describes two prototypical situations in which this rule is manifest. In one situation someone asks the child "what's that?" as he points to something, and the child replies with a name and some introducer such as "it" or "that" (as in "it doggie"). In the second situation, the child initiates the interaction and precedes the name of the object with a word like "this," "that," or "see" (as in "see doggie").

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APPENDIX C

Materials for Administration of the Environmental Language Inventory: Conversation and Imitation Tasks

To administer the ELI the examiner should have the following objects:

paper	pen
large ball	small ball
dry cereal bits	large car
small car	doll with removable dress
dog	small book
blocks	cup
bag	regular size chair

It should be kept in mind, however, that for diagnostic use of the ELI these objects are only suggested non-linguistic stimuli and that the examiner may substitute items to meet the needs of each child. For experimental use, the items should be kept constant.

APPENDIX D

Title - Preschool Behavior Questionnaire (PBQ)

Author - Lenore Behar and Samuel Stringfield

Date Developed - 1974

Available From - Learning Institute of North Carolina
1006 Lamond Avenue
Durham, North Carolina 27701

Age Range - Preschool

Located From - Behar, L., & Stringfield, S. "A Behavior Rating Scale for the Preschool Child." Developmental Psychology, Vol. 10, no. 5, 601-610, 1974.

Description

This scale was developed as a screening instrument to be used by teachers and child care workers in the early detection of children's emotional problems. The PBQ is a modification of the Children's Behavior Questionnaire, a 29 item behavior check-list previously standardized in England on elementary school children (Rutter, 1967). The Preschool Behavior Questionnaire consists of 29 items rated on a three-point scale from "Doesn't apply" to "Certainly applies". The scored answers can then be added to produce three factor scores and percentile rankings: Hostile-Aggressive, Anxious, Hyperactive-Distractible.

Administration and Scoring

The subject is observed for a period of time. The prevalence of the thirty described items is rated, the scores are added, and plotted on a table which indicates the percentile ranking of the scores.

Standardization

This scale was standardized on a sample of over 600

children. Of this population, 496 normal children from North Carolina and Oregon were selected. The sample equally represented the sexes, a wide range of socio-economic status, and included black and white children in proportion to the general population. A sample of 102 preschoolers, whose primary diagnosis was emotional disturbance was also used in the study.

Reliability

Average interrater reliability coefficients ranged between .67 for the Hyperactive factor to .84 for Total score. Average test-retest reliability over a three to four month period ranged from .60 for the Anxious factor to .94 for the Hyperactive factor.

Validity

Analysis of each item and of the total scale score indicated that 31 of the 35 original items differentiated between normal and deviant subjects. Those items which discriminated best were similar to items which others had previously found to discriminate between normal and deviant children. In two follow-up studies the PBQ was found to differentiate between the two groups (Behar, 1974).

THE PRESCHOOL BEHAVIOR QUESTIONNAIRE

Dr. Lenore Behar
Samuel Stringfield

LINC Press
Learning Institute of North Carolina
Durham, N.C. 27701

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Child's Name _____ School Attending _____

Parents' Name _____ Sex (circle) M F

Address _____ Present Date Month ___ Day ___ Year ___
(Street)

_____ Child's Birthday ___ ___ ___
(City, State, Zip Code)

Rated by _____ Age of Child ___ ___ ___

Title of Rater _____

Length of Time Rater Has Worked with Child (months or weeks) _____

Following is a series of descriptions of behavior often shown by preschoolers. After each statement are three columns, "Doesn't Apply," "Applies Sometimes," and "Certainly Applies." If the child shows the behavior described by the statement frequently or to a great degree, place an "X" in the space under "Certainly Applies." If the child shows behavior described by the statement to a lesser degree or less often, place an "X" in the space under "Applies Sometimes." If, as far as you are aware, the child does not show the behavior, place an "X" in the space under "Doesn't Apply."

Please put ONE "X" for EACH statement.

	Doesn't Apply	Applies Sometimes	Certainly Applies	For Scorer's Use Only			
1. Restless. Runs about or jumps up and down. Doesn't keep still	___	___	___	___			___
2. Squirmy, fidgety child	___	___	___	___			___
3. Destroys own or others' belongings	___	___	___	___	___		
4. Fights with other children	___	___	___	___	___		
5. Not much liked by other children	___	___	___	___	___		
6. Is worried. Worries about many things	___	___	___	___		___	
7. Tends to do things on his own, rather solitary	___	___	___	___			

	Doesn't Apply	Applies Sometimes	Certainly Applies	For Scorer's Use Only			
				Total	1	2	3
8. Irritable, quick to "fly off the handle"	—	—	—	—			
9. Appears miserable, unhappy, tearful, or distressed	—	—	—	—			
10. Has twitches, mannerisms, or tics of the face and body	—	—	—	—			
11. Bites nails or fingers	—	—	—	—			
12. Is disobedient	—	—	—	—			
13. Has poor concentration or short attention span	—	—	—	—			
14. Tends to be fearful or afraid of new things or new situations	—	—	—	—			
15. Fussy or over-particular child	—	—	—	—			
16. Tells lies	—	—	—	—			
17. Has wet or soiled self this year	—	—	—	—			
18. Has stutter or stammer	—	—	—	—			
19. Has other speech difficulty	—	—	—	—			
20. Bullies other children	—	—	—	—			
21. Inattentive	—	—	—	—			
22. Doesn't share toys	—	—	—	—			
23. Cries easily	—	—	—	—			
24. Blames others	—	—	—	—			
25. Gives up easily	—	—	—	—			
26. Inconsiderate of others	—	—	—	—			
27. Unusual sexual behaviors	—	—	—	—			
28. Kicks, bites, or hits other children	—	—	—	—			
29. Stares into space	—	—	—	—			
30. Do you consider this child to have behavior problems?	—	—	—	—			
TOTALS							

The scoring system for the PBQ is as follows:
All items marked "Doesn't Apply" are scored "0"
All items marked "Applies Sometimes" are scored "1"
All items marked "Certainly Applies" are scored "2"
For each behavior, fill in the appropriate score in the column. If this blank has to its right a series of dots followed by a second blank, then also fill in that second blank with the child's score on that item. Add all of the numbers in each of the four columns and transfer those totals to the following table. If the exact score appears on the table, circle it. If not, enter the exact score in the appropriate place and circle it.

percentile rank	TOTAL behavior disturbed	Scale 1 hostile-aggressive	Scale 2 anxious	Scale 3 hyperactive-distractible	percentile rank
99	29	14	9	8	99
	26	11	8	7	
			7		
95	23	10	6	6	95
		9			
	20	8	5		
90	17	7		5	90
		6	4	4	
	15	5			
80	13	4			80
		3	3		
	11			3	
65	9	2			65
			1		
50	7	1		2	
	6	0	0	1	50
	4			0	
25					25
	2				
	1				
0	0				0

Data from the Replication Study and the Original Validity Study of the Preschool Behavior Questionnaire*

Table IV. Normal versus Disturbed Groups: Means, Standard Deviations, and Mean Differences as Rated by Teachers and Aides

	Validity study			Reliability-replication study				
	Teachers			Teachers			Aides	
Scale	*N*	*M*	*SD*	*N*	*M*	*SD*	*M*	*SD*
Hostile								
Disturbed	102	6.24	4.15	9	8.11	3.22	8.56	3.71
Normal	496	2.66	3.35	80	3.16	3.03	4.35	4.24
Difference		3.58[a]			4.95[a]		4.21[a]	
Anxious								
Disturbed	102	6.73	3.61	9	6.22	3.49	5.89	3.26
Normal	496	1.96	2.34	80	2.42	2.40	2.51	3.05
Difference		4.77[a]			3.80[a]		3.38[b]	
Hyperactive								
Disturbed	102	4.75	2.26	9	3.22	1.20	2.44	2.67
Normal	496	2.21	2.21	80	1.82	1.81	2.05	2.19
Difference		2.54[a]			1.40[a]		.39	
Preschool Behavior Questionnaire total								
Disturbed	102	21.30	7.19	9	21.22	5.21	24.67	8.90
Normal	496	8.09	7.25	80	8.74	5.96	12.41	10.01
Difference		13.21[c]			12.48[c]		12.26[b]	

[a] $p = .001$.
[b] $p = .01$.
[c] $p = .0001$.

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* Behar, 1977, p. 272.

APPENDIX E

Title - Environmental Language Inventory (ELI)

Author - James MacDonald and Marjorie Nickols

Date Developed - 1974

Available From - The Nisonger Center
The Ohio State University
Columbus, Ohio

Developmentally Appropriate - Children using utterances of two or more words.

Located From - MacDonald, James and Blott, Judith.
"Environmental Language Intervention: The Rationale for a Diagnostic and Training Strategy Through Rules, Context, and Generalization." Journal of Speech and Hearing, Vol. 39(3), 244-256, 1974.

Description

The Environmental Language Inventory (ELI) is a semantic based diagnostic instrument of early language development. The scale was designed to assess the child whose language is composed of at least two-word utterances.

The ELI selects as the content for diagnosis those semantic-grammatical rules, i.e., meaning units, which comprise the first sentences of normally developing children. The ELI construction reflects the careful consideration of recent research findings by Bloom, Brown, and Schlesinger discussed earlier. The semantic-grammatical rules are evaluated in three production modes - conversation, imitation, and play. The authors state that the information that is provided is useful in designing a language training program.

In addition to assessment, the ELI is also designed for use in training. Performance on the diagnostic instrument directs the language trainer to those semantic-grammatical rules and utterance lengths which may be the focus of training in

order to effect increased functional language in the child with language deviations (See MacDonald and Blott, 1974).

Administration and Scoring

The ELI consists of 30 stimulus sets, each of which includes one non-linguistic cue and two linguistic cues. The semantic-grammatical rules are each assessed by three of the sets. The non-linguistic cue provides the environmental cues which specify the meaning expressed by the rule; the same non-linguistic cue is used to assess both the conversational (c) and imitative (i) production of a rule. Separate linguistic cues are used: one to elicit the rule in conversation, the other in imitation.

The following is an example of the full procedure for one item:

Example: 13. Action and Object (AO)

1. Stack blocks

(c) "Tell me what I did."

(i) "Say, 'Build blocks'."

The first instruction in each item gives the single non-linguistic cue (in this example, "Stack blocks"), which tells the examiner the action to perform. In this example, the examiner administers the conversation task (c) first by stacking the blocks and saying "Tell me what I did." After giving the child recognition for his response, the examiner performs the initative task by again stacking the blocks, this time saying "Say, 'Build blocks'", for a two-word imitative production of the rule, Action and Object.

Each of the 3 items consists of a conversation task followed by an imitative task. The same non-linguistic cue (action) is presented with each task while separate linguistic cues are given.

The spontaneous (or "free production") language sample may be taken initially or during a break from the conversation - imitative procedure.

The ELI manual provides instructions for the immediate written record of the childs' utterances. Directions for scoring the semantic-grammatical rules are as follows:

1. Before scoring an ELI, review the definitions of each.

2. Score only those responses with at least two intelligible words.

3. Use the grid under "Semantic-grammatical Rules" on the recording forms for noting the frequencies of each rule.

4. Note that the childs' response will often not correspond to the category in which the stimulus set occurs. For example, in item A.1, the non-linguistic cue of "moving car" may elicit a response of "push car" instead of the intended Agent + Action response -- "car go". Be sure to score the utterance as produced.

5. A given utterance may be scored with several rules. The issue is to determine the separate meanings between pairs of words. Every two-word combination that expresses a meaningful relation between the words is scored as a rule even if the two words scored are separated by other words. Also, a given rule may occur more than once in an utterance. The samples scored below illustrate this.

6. To determine the total frequencies of the rules, sum the frequencies in each column on the recording forms, enter sums in the rows for totals on each sheet, then sum the individual totals and enter this overall

sum in the Grand Totals row on the last sheet of the recording form. (p. 30-31)

Additional instructions for determining the rank order and proportions of rules, and for scoring of utterance length and intelligibility are provided. The author cautions that not all possible scores may be needed for a given study.

Standardization

The normative sample included 25 normally developing preschool children attending a day care center. Five subjects were chosen for each six-month age range between 2 and 4-1/2 years. Teachers interviews were used to identify children who satisfied four criteria: at least 50% intelligible speech, spontaneous use of two-word utterances, no history of speech or hearing disorders, and no foreign language spoken in the home. Results of the study provided the relative distributions of the rules for all 25 children and for each of the five age groups. The study also indicated that age is not a predictor of semantic development, for only the rule Agent + Action increased in frequency as age increased. A third finding was that mean length of utterance (MLU) correlated positively with Agent + Action and Agent + Object, and negatively with the rule X + Locative. This result lends support to Brown's (1973) contention that two children matched in MLU are more likely to have similar language structures that two children matched in age.

Validity

Five normally developing preschool children and five retarded children between 8 and 12 years of age were administered

the ELI conversation and imitation tasks. A spontaneous language sample was recorded according to Johnson, Darly, and Spriesterbauch (1963). The patterns of rules yielded by the ELI for both the normal and retarded subjects were similar to those occurring in the spontaneous sample. For the normal subjects, the rank orders of rules occurring in both the spontaneous and ELI elicited language was significantly correlated.

ENVIRONMENTAL LANGUAGE INVENTORY

James D. MacDonald, Ph. D.
Marjorie Nickols, M.A.
The Nisonger Center, Ohio State University

ADMINISTRATION AND RECORDING FORM
CONVERSATION-IMITATION

Client_____ Date_____ Birthdate_____ Examiner_____

Recorder_____ Diagnostic or Experimental Procedure D ___: E___

Comments on alterations for diagnostic use:_____

Examiner's Cue	Client's Response	Length		Semantic Grammatical Rules								
		Total	Intel	AA	AO	AGO	NP	MR	MX	XLAO	XLAC	IX
Pretest Items												
*1.Do action of sitting down. (c) "Tell me what I'm doing."	(c)_____											
(i) "Say, 'sit down'."	(i)											
2. Clap hands. (c) "Tell me what I'm doing."	(c)_____											
(i)"Say, 'clap hands'."	(i)											
3. Touches child's hand. (c)"What is this?"	(c)_____											
(i) "Say, 'my hand'."	(i)											

* Sample instruction: Simultaneously present the nonlinguistic cue (Examiner sits down) and the linguistic cue for conversation (c) (Tell me what I'm doing.) Record child's response. Then simultaneously present the same nonlinguistic cue again (Sits down) this time with the linguistic cue for imitation (i) (Say, sit down). Again record child's response and proceed to next item.

Examiner's Cues	Client's Response	Length		Semantic Grammatical Rules										
		Total	Intel	AA	AO	AGO	NEP	NER	MHA	X	XLAO	XLAC	X	I
A. Agent + Action (AA)														
1. Moves car. (c) "Tell me what happened."	(c)													
(i) "Say, 'Car go'."	(i)													
2. Writes on paper with pen. (c) "Tell me what I did."	(c)													
(i) "Say, 'You write paper'."	(i)													
3. Kisses doll, then extends doll for child to kiss. (c) "Tell me what you did."	(c)													
(i) "Say, 'I kiss the baby'."	(i)													
B. Action + Object (AO)														
1. Stack blocks. (c) "Tell me what I did."	(c)													
(i) "Say, 'Build blocks'."	(i)													
2. Throws small ball in air. (c) "Tell me what I did."	(c)													
(i) "Say, 'Throw ball up'."	(i)													
3. Kicks large ball. (c) "Tell me what I did."	(c)													
(i) "Say, 'Kick the big ball'."	(i)													
Number of Utterances	(c) ____ Total													
	(i) ____ Total													

(3)

Examiner's Cues	Client's Response	Length		Semantic Grammatical Rules									
		Total	Intel	A A	A O	AG O	M H P	M. H R	M H A	N X	X L AO	X L C	I X
C. Agent + Object (AgO)													
1. Puts cup to doll's mouth.													
(c) "Tell me what she did.	(c)												
(i) "Say, 'Baby cup'."	(i)												
2. Pushes car to child.													
(c) "Tell me what I did."	(c)												
(i) "Say, 'You push car'."	(i)												
3. Rolls ball to child, gestures for return.													
(c) "Tell me what you did."	(c)												
(i) "Say, 'I roll the ball'."	(i)												
D. Modifier + head (Possession) (MHP)													
1. Points to child's pants/dress.													
(c) "Tell me what this is." (Wait for child's response then say: "whose pants/dress?"	(c)												
(i) "Say, 'My pants/dress'."	(i)												
2. Points to child's hair.													
(c) "tell me what this is."	(c)												
(i) "Say, 'That's my hair'."	(i)												
3. Takes child's hand.													
(c) "Tell me what I did."	(c)												
(i) "Say, 'You take my hand'."	(i)												
Number of Utterances	(c) ____ Total (c)												
	(i) ____ Total (i)												

Examiner's Cues	Client's Response	Length		Semantic Grammatical Rules									
		Total	Intel	AA	AO	AGO	IP	IR	EA	X	XL AO	XL AC	IX
E. Modifier + Head (Recurrence) (MR)													
1. Gives child small piece of paper to color, withholds rest.													
(c) "Tell me what you want?"	(c)												
(i) "Say, 'More paper'."	(i)												
2. Crashes two cars together, then gives one to child.													
(c) "Tell me what you want."	(c)												
(i) "Say, 'Want another car'."	(i)												
3. Gives child small piece of cereal, shows child more.													
(c) "Tell me what you want."	(c)												
(i) "Say, 'I want more cereal'."	(i)												
F. Modifier + Head (Attribution) (MA)													
1. Shows both balls, then removes small one from sight.													
(c) "Tell me what you see."	(c)												
(i) "Say, 'Big ball'."	(i)												
2. Shows both cars, removes big one from sight.													
(c) "Tell me what you see."	(c)												
(i) "Say, 'See little car'."	(i)												
Number of Utterances	(c) ____	Total c											
	(i) ____	Total i											

Examiner's Cues	Client's Response	Length: Total	Length: Intel	Semantic Grammatical Rules: A A	A O	AO O	N P	M N P	N P A	N X	X L AO	X L AC	I X
3. Shows both dolls, removes boy from sight.													
(c) "Tell me what you see."	(c)												
(i) "Say, 'I see girl doll'."	(i)												
G. Negation + X (NX)													
1. Shows car.													
(c) "Tell me, is this a dog?"	(c)												
(i) "Say, 'No dog'."	(i)												
2. Gives doll to child.													
(c) "Tell her not to cry."	(c)												
(i) "Say, 'No cry baby'."	(i)												
3. Shows block.													
(c) "Tell me, is this a car?"	(c)												
(i) "Say, 'That's not a car'."	(i)												
H. X (Agent or Object) + Location (XL-AO)													
1. Puts dog on chair.													
(c) "Tell me where it is."	(c)												
(i) "Say, 'Dog chair'."	(i)												
2. Puts small ball in cup.													
(c) "Tell me where it is."	(c)												
(i) "Say, 'Ball in cup'."	(i)												
Number of Utterances	(c) ___ Total (c)												
	(i) ___ Total (i)												

Examiner's Cues	Client's Response	Length		Semantic Grammatical Rules									
		Total	Intel	AA	AO	AC-O	[illegible] P	[illegible] R	[illegible] A	[illegible] X	XL-AO	XL-AC	I-X
3. Puts car on chair.													
(c) "Tell me where it is."	(c)_____												
(i) "Say, 'Car is on chair'."	(i)												
I. X (Action) + Location (XL-ACT)													
1. Gets ready to push car to child.													
(c) "Tell me what to do."	(c)_____												
(i) "Say, 'Push here'."	(i)												
2. Gets ready to roll ball.													
(c) "Tell me what to do."	(c)_____												
(i) "Say, 'Roll ball here'."	(i)												
3. Gets ready to put book in bag.													
(c) "Tell me what to do."	(c)_____												
(i) "Say, 'Put book in bag'."	(i)												
J. Introducer + X (IX)													
1. Shows doll.													
(c) "The dolly just came in, say hello to her.	(c)_____												
(i) "Say, 'Hi doll'."	(i)												
Number of Utterances	(c) ____ (i) ____	Total (c)											
		Total (i)											

ENVIRONMENTAL LANGUAGE INVENTORY

FREE PLAY
Response Form

Utterance	Length in words		Semantic Grammatical Rules											Type of Response		
	T	I	A A	A O	AO O	N H P	N I R	N E A	N X	X L AO	X L AC	I X		I	C	S

APPENDIX F

Title - Developmental Sentence Analysis (DSA)

Author - Laura Lee

Date Developed - 1974

Available From - Northwestern University Press
Northwestern University
Evanston, Illinois

Developmentally Appropriate - Children using one or more word utterances

Located From - Lee, Laura
Developmental Sentence Analysis
Northwestern University Press
Evanston, 1974

Description

Developmental Sentence Analysis (DSA) is an individually administered procedure which provides a way of measuring language development in terms of the increasing grammatical load of a child's spontaneous speech in conversation with a language clinician.

Theoretical Assumptions

Developmental Sentence Analysis is neither completely traditional nor psycholinguistic in nature. It does not adhere to any formalized grammatical theory or method. In Chompskyan terms, DSA is attending largely to surface structure, to the final spoken form of a sentence.

The basic syntactic sturcture of English is the grammatical relationship of the subject, verb, and object within a sentence. Children obviously do not begin to speak in subject-verb-object form, but it is one of the first adaptations they make to conform with adult language. The combination of various

syntactic and morphological rules produces a grammatical load which is measurable for every sentence a child speaks. As the child acquires linguistic abilities, the grammatical load of his speech increases along two dimensions: he masters new morphological forms and syntactic structures in a developmental progression, and he incorporates more of these forms into each sentence. Lee states that both of these developmental aspects must be considered when assessing a child's language.

All children must learn the same language, vocabulary, phonology, grammatical structure and morphological forms. Developmental Sentence Analysis may be used to assess a child's inclusion of adult grammatical rules into his or her spontaneous speech. To the degree that a child is behind schedule, Lee would have that child called "language delayed".

Children who have been labeled as "language delayed" are not merely following the natural pattern of development at a slower rate but are failing to make some of the linguistic generalizations on which syntactic development depends. The Developmental Sentence Analysis can be used to analyze and evaluate a child's language in comparison to normal syntactic development.

DSA consists of two separate procedures - Developmental Sentence Types (DST) and Developmental Sentence Scoring (DSS). If the clinician is uncertain as to which method of analysis is most appropriate, both should be done.

The DST chart classifies pre-sentence utterances in an attempt to discover whether they show emerging

grammatical structure, whether the child's spontaneous speech includes a wide variety of grammatical rules, and whether the pattern of grammatical development is one which leads in progressive steps toward complete sentence formation. The DST are based on the assumption that a child's acquisition of adult rules of syntax progresses in a serious of steps which are cumulative. Lee believes the DST presents a theoretical construct of the early syntactic development in children's language, beginning with single words and tracing the emergence of two-word combinations and multi-word constructions.

The DST was created to distinquish between different kinds of utterances with different semantic contents, information, or messages. The DST provides for analysis of three levels of utterances: single words, two-word combinations, and constructions. The DST chart is read vertically. Five pre-sentence types are noted: the noun or noun phrase, the designative utterance (beginning with the words this, that, here, there, and it), the predicative utterance (noun and descriptive item), verbal utterances, and fragments.

Administration and Scoring of the Developmental Sentence Analysis

DSA is a method for making a detailed, readily qualified and scored evaluation of a child's use of standard English grammatical rules. This is done by assessing the tape-recorded samples of a child's spontaneous speech in conversation with an adult.

Laura L. Lee, Professor of Speech and Language Pathology

at Northwestern University, is the creator of DSA. In her book, Developmental Sentence Analysis (1974), she provides specific guidelines and techniques on taking a language sample, directions for transcribing the tape, and how to select the corpus for grammatical analysis.

Lee suggests that the language sample should contain one hundred utterances for analysis by DST. Because one of the problems in analyzing a language sample is determining how much of a child's language to label a single utterance, Lee provides some guidelines and examples to facilitate the determination.

No overall score is given to DST classifications. However, there are a number of ways one can analyze the DST chart to arrive at a conclusion regarding the child's language development. The number of utterances at each DST level can be entered on a record sheet so one can evaluate at a glance how many single words, two-word combinations, multi-word constructions, and complete sentences were spoken in the corpus of one hundred utterances.

An alternative method of analysis of the DST chart can be made by comparing the number of entries in each of the five vertical columns. This analysis would indicate whether the child is developing a variety of sentence types in his productive language.

Lee (1974) cautions language evaluators about being overly rigid in using the DST chart for clinical purposes. She encourages modification, simplification or enlargement of the DST procedure in any way appropriate.

Standardization

DST classifications were made on the language samples of 40 normally developing children at three-mouth intervals between 2-0 and 2-11 years. By comparing the performances of these children to several "clinical" children, Lee found that the language delayed children went through the same developmental steps but at a slower rate. Lee provides ten charts depicting examples of both normal and delayed language. Also provided are the frequencies of utterances in each of the five DST sentence types and each of the three DST levels in the language samples of the normal children by three-month age groups. As previously indicated, no overall score can be derived from the DST classifications - only data that can be used as a basis for comparison.

Developmental
Sentence Types
L. Lee
Northwestern University

Recording Date:
Birthdate:
CA:

Single Words:
2-Word Comb.
Sentences:
Constructions:
Don't Fits:

Single Words

Noun	Designator	Adjective	Verb	Vocab. Items

Constructions 2-Word Comb.

Noun Phrase	Designative	Predicative	Verbals	Fragments

Chart The Developmental Sentence Types (DST) Classification of Pre-sentences

	NOUN	DESIGNATOR	DESCRIPTIVE ITEM	VERB	VOCABULARY ITEM
Single words	*car, truck, cookie, Daddy, Mommy, girl, kitty-cat, Santa Claus, hot-dog* Basic sentence elaborations: Plural: *books, cars, men* Basic sentence modifications: Pronoun: *me, something, nobody* Question: *book? car? truck (right?)*	*here, there, this, that, it* Basic sentence elaborations: Plural: *those, these* Basic sentence modifications: Question: *this? that? here? there?*	*big, pretty, broken, fixed, one, two, more, on, off, up* Basic sentence elaborations: None Basic sentence modifications: Pronoun: *my, his* Question: *red? big (huh?)*	*sleep, eat, walk, fall, (look, lookit, wait, stop= imperative sentence)* Basic sentence elaborations: Verb elaboration: *going, fell* Basic sentence modifications: Negative: *can't, won't (don't=imperative sentence)* Question: *see? eat (OK?)*	*yes, no, OK, sh, hey, hi, bye-bye, night-night, oh-oh* Basic sentence elaborations: Adverb: *again, now, too* Basic sentence modifications: Question: *huh? right? OK?* Wh-question: *what? who? where? when? how? why?* Conjunction: *because*
	NOUN ELABORATION	**DESIGNATIVE ELABORATION**	**PREDICATIVE ELABORATION**	**VERBAL ELABORATION**	**FRAGMENTS**
2-word combinations	Noun phrase Article: *a car, the truck* Possessive: *Daddy car, Billy truck* Quantifier: *more car, other truck, two boy* Adjective: *big car, dirty truck, red shoe* Attributive: *baby bear, police car* Basic sentence elaborations: Plural: *the cars, more trucks* Additive: *car truck, Mommy Daddy* Adverb: *now car, truck too, car again* Subject-object: *doggie bone, Daddy ball* Subject-locative: *car garage, Mommy window* Basic sentence modifications: Pronoun: *this one, my truck, her cookie* Negative: *not car, not truck, not this* Question: *a car? another truck (OK?)* Wh-question: *what car? which one?* Conjunction: *and car, and truck, and this*	Designator + noun *here car, there truck, this car, that truck, it car, it truck* Basic sentence elaborations: Plural: *these cars, there trucks* Adverb: (*that again* = noun + adverb) (*there now, here again* = fragments) Basic sentence modifications: Pronoun: *here something, there one* Negative: *(not this* = noun + negative) (*not here, not there* = fragments) Question: *that truck? this car (right?)* Wh-question: *what this? who that?* Conjunction: *(and this* = noun + conj.) (*and here, and there* = fragments)	Noun + descriptive item *car broken, truck dirty, light off, TV on, car there, truck here* Basic sentence elaborations: Plural: *cars here, lights on* Basic sentence modifications: Pronoun: *that pretty, it big, something here, another one* Question: *car broken? it gone (right?)* Wh-question: *where car? what here? who there?*	Verb + object: *hit ball* Verb + locative: *sit chair* Verb + particle: *fall down* (Noun + verb=sentence: *baby sleep, that go, it fall)* Basic sentence elaborations: Verb elaboration: *saw car* Plural: *eat cookies, see cars* Adverb: *eat now, fall too* Basic sentence modifications: Pronoun: *see it, find one* Negative: *not fall, can't go* Question: *see it? go home?* Wh-question: *where go? what take? what find? (who go? what come?= sentence)* Conjunction: *and sleeping* Infinitive: *wanna go, gonna go*	Basic sentence elaborations: Prepositional phrase: *for Daddy, in car* Plural: *on chairs, in cars* Adverb: *too big, all gone, up now, here again, right here, over there* Basic sentence modifications: Pronoun: *to you, in it* Negative: *not big, not here* Question: *in here? all gone (huh?)* Conjunction: *and big, but dirty, and here*
Constructions	Noun phrase *my big car, some more truck, a red box* Noun phrase + prepositional phrase *the car in front, the spot on the floor* Quantifier + prepositional phrase *all of them, some of the other cars* Basic sentence elaborations: Plural: *some other cars* Adverb: *now the car, the other truck too* Additive: *the car the truck* Subject-object: *the doggie another bone* Subject-locative: *the car the garage* Basic sentence modifications: Pronoun: *his other truck, all of mine* Negative: *not the car, not that one* Question: *the other car? the boy too (huh?)* Wh-question: *what big car? which other one? how much milk? how many cookies? how about that one? what about me?* Conjunction: *and the car, car and truck*	Designator + noun phrase *here another car, there a truck, this a red car, that my truck, it a big car, it my truck* Basic sentence elaborations: Plural: *here some cars, these big cars* Adverb: *there car too, here car now* Additive: *there Mommy Daddy* Basic sentence modifications: Pronoun: *that somebody car, here his car* Negative: *that not car, this not a truck* Question: *that a car? this a car (right?)* Wh-question: *who that boy? what that one?* Conjunction: *here a car and truck*	Noun phrase + descriptive item: *the car broken, a truck dirty, this light off, the TV on, other car there, a truck here, car in garage, hat on head, Spot a good dog, Tom bad boy* Basic sentence elaborations: Plural: *all cars broken* Adverb: *light off now, car here too, truck too dirty* Double locator: *car over there* Basic sentence modifications: Pronoun: *he bad boy, it off now* Negative: *this not broken* Question: *it off now? car over there (huh?)* Wh-question: *where that one? who in car? what color car? what in. ere?* Conjunction: *car and truck here*	Verb + object: *eat the cookie* Verb + locative: *put the table* Verb + particle + noun: *take off hat, turn on light* (Noun phrase + verb=sentence *the car go, a boy eat)* Basic sentence elaborations: Verb elaboration: *goes in barn* Adverb: *see car now, go in too* Basic sentence modifications: Pronoun: *want it now* Negative: *not fall down* Question: *see that one? eat more cookies (OK?)* Wh-question: *where put car? what take out? what find here? what doing to car?* Conjunction: *and find car* Infinitive: *wanna see it, gonna go home, gotta find it*	Words in series: *1, 2, 3, 4,* etc, *dog, cow, pig,* etc. Basic sentence elaborations: Prepositional phrase: *in the car, for the boy* Plural: *on the chairs* Adverb: *in car too, back over there* Basic sentence modifications: Pronoun: *on my head* Negative: *not in it* Question: *in here too? in the car (right?)* Conjunction: *and for me*

APPENDIX G

Table 5: Mean percentages and rank orders of semantic-grammatical rules used in ELI Conversation by 25 normal preschool children, according to age groups. Rank orders are in parentheses.

CONVERSATION

Age Group	Ag+Ac	Ac+Ob	Ag+Ob	M+H	N+X	X+D	X+L	I+X
I. 2-0 to 2-5	23.6(2)	30.0(1)	12.4(4)	5.6(7)	8.2(5)	0.8(8)	20.2(3)	6.8(6)
II. 2-5 to 2-11	17.8(3)	20.4(2)	9.0(6)	12.4(5)	8.2(7)	0.6(8)	23.0(1)	16.6(4)
III. 3-0 to 3-5	25.6(1)	22.2(2)	12.2(4)	9.8(5)	6.8(6)	0.8(8)	16.4(3)	6.0(7)
IV. 3-6 to 3-11	30.2(1)	20.0(2)	12.8(4)	7.4(5)	6.0(6)	1.4(8)	18.6(3)	5.6(7)
V. 4-0 to 4-5	28.0(1)	24.0(2)	10.6(5)	2.8(7)	11.8(4)	0.8(8)	17.8(3)	4.8(6)
MEAN	25.0(1)	23.3(2)	11.4(4)	7.6(7)	8.2(5)	0.9(8)	12.2(3)	8.0(6)

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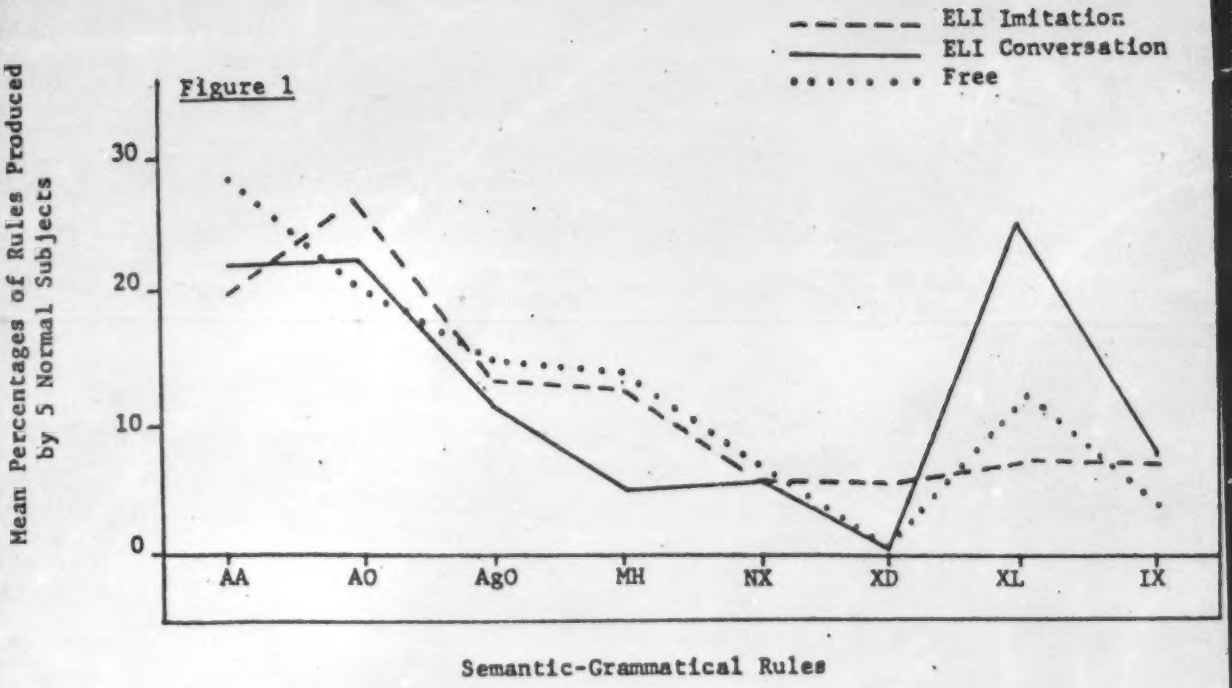

Figure 1

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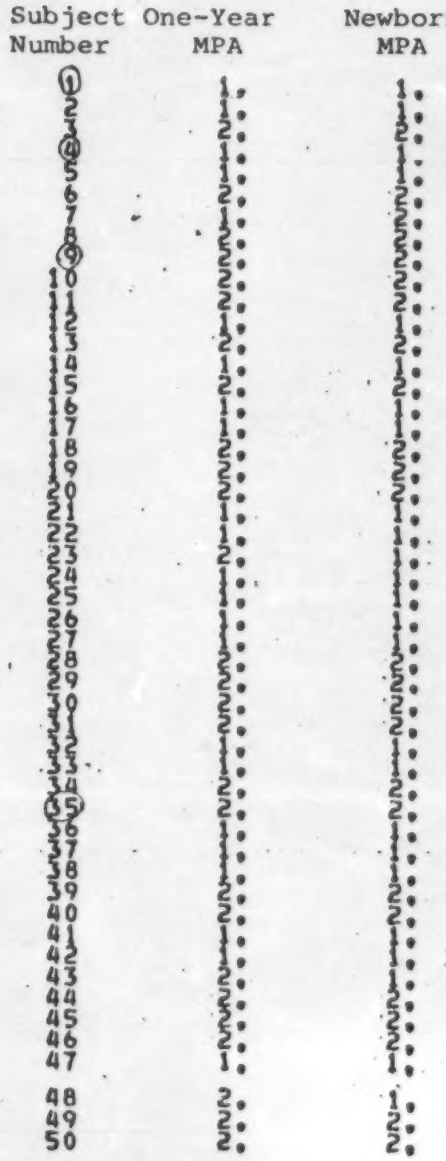
APPENDIX H

Raw Scores of Indicated Variables
for the 50 Subjects



○=Subject with Identified Language Disorder

Raw Scores of Indicated Variables
for the 50 Subjects

Subject Number	OB	FAM	PRESCHOOL BEHAVIOR QUESTIONNAIRE - TOTAL	HOSTILE	ANXIOUS	HYPERACTIVE
1	1.	0.	0.	0.	0.	0.
2	0.	0.	20.	7.	1.	7.
3	0.	0.	6.	4.	0.	0.
4	0.	1.	0.	0.	0.	0.
5	0.	1.	4.	2.	0.	0.
6	0.	1.	11.	2.	0.	6.
7	0.	1.	2.	0.	0.	0.
8	0.	1.	5.	0.	0.	0.
9	0.	1.	0.	0.	0.	0.
10	1.	1.	1.	0.	0.	0.
11	0.	1.	3.	0.	0.	0.
12	0.	1.	2.	0.	0.	0.
13	0.	1.	0.	0.	0.	0.
14	0.	1.	0.	0.	0.	0.
15	0.	1.	12.	2.	0.	6.
16	0.	1.	7.	2.	0.	0.
17	0.	1.	9.	2.	0.	0.
18	0.	0.	2.	0.	0.	0.
19	1.	0.	16.	5.	1.	6.
20	0.	1.	0.	0.	0.	0.
21	0.	1.	11.	2.	0.	6.
22	0.	1.	6.	2.	0.	0.
23	0.	1.	4.	2.	0.	0.
24	0.	1.	3.	0.	0.	0.
25	0.	1.	26.	15.	1.	6.
26	0.	1.	6.	2.	0.	0.
27	0.	1.	14.	5.	1.	6.
28	0.	1.	3.	0.	0.	0.
29	0.	1.	3.	0.	0.	0.
30	0.	1.	10.	2.	0.	6.
31	0.	1.	4.	2.	0.	0.
32	0.	1.	4.	2.	0.	0.
33	0.	1.	3.	0.	0.	0.
34	0.	1.	3.	0.	0.	0.
35	0.	1.	2.	0.	0.	0.
36	0.	1.	6.	2.	0.	0.
37	0.	1.	13.	5.	1.	6.
38	0.	1.	2.	0.	0.	0.
39	0.	1.	10.	2.	0.	6.
40	0.	1.	5.	0.	0.	0.
41	0.	1.	11.	5.	1.	6.
42	0.	1.	11.	5.	1.	6.
43	0.	1.	21.	7.	3.	6.
44	0.	1.	6.	0.	1.	2.
45	0.	0.	4.	0.	1.	2.

APPENDIX I

ANCILLARY FINDINGS AND DISCUSSION

As indicated in Chapter III, additional statistical analyses were performed using data collected to test the hypotheses of the present study as well as incidental data, such as age and sex, collected during the present investigation, and data collected during the clinical evaluations of the subjects at one and two years of age. This Appendix discusses the results and findings of these additional analyses. Findings concerning the relationship between language delay and other variables are presented first. They are followed by findings concerning the relationship between behavior disorders and selected variables.

1. The mean age of the sample was 26 months, with a range of 23 to 28 months. A statistical analysis was made to determine whether there was a significant relationship between mean length of utterance (MLU) and the age at which the language sample was recorded. Analysis of the relevant data indicated a low but significant relationship ($r = .2818$, $N = 48$, $p = .026$).

Language development is a dynamic process throughout the lifespan. It has been noted, particulary, that the early stages of language acquisition are characterized by rapid changes. Brown (1973), Tyack and Gottsleben (1974) and others have identified stages in early language acquisition which include marked increases in MLU within each closely spaced six month period. This significant relationship confirms empirical data, clinical reports, and common knowledge that language abilities increase with age.

2. The Receptive-Expressive Emergent Language (REEL) Scale provides a simple systematic way of obtaining language development information from a child's mother. The determination of mean length of utterance (MLU), an established clinical procedure, is obtained by recording and analyzing a 50-utterance sample of spontaneously produced language. MLU was correlated with expressive language skills, as determined by the REEL, during the two-year clinical evaluation. A moderately high significant relationship was found ($r = .7815$, $N = 48$, $p = .001$). Thus, a simple screening device (the REEL) appears to be able to differentiate children's language abilities in a way that associates with the substantially more complex language analytical procedure. The finding of this study, that there is a significant correlation between MULs and the REEL, suggests that parental reports used as part of a screening procedure may effectively identify those children who need further assessments. While the MLU is a widely accepted reliable index of a child's current language functioning, many professionals hesitate to use parental reports as part of the evaluation process. The findings of the present study provide evidence supporting the selection and use of parental interviews as a source of information concerning language development.

3. Language and cognition are seen as closely related, interacting areas of development. While MUL only indicates the length of the child's utterances, Brown (1973) supports its use as an index of language development because the developing language components become increasingly complex as MLUs increase. A test of the relationship between MLU and the scores of the

Bayley Scale of Infant Mental Development administered during the one-year clinical evaluation found a moderate but significant relationship ($r = .4386$, $N = 48$, $p = .001$). This finding supports the Piagetian view that cognitiion and language are interrelated abilities. Measures of infant ability are not considered to be accurate predictors of later development Yang and Bell, 1975). Therefore, it is particularly interesting that, in this study, there was a significant correlation between an infant scale and later language skills.

4. Females have traditionally been viewed as developing language earlier than males. The mean MLU of males ($N = 27$) and females ($N = 21$) in the present sample was evaluated using the t-test for differences between independent means in an attempt to test this view. Results of this analysis indicated significant differences between the groups ($t = -2.36$, $p = .012$). The mean MLU for males was 2.3740 while the female subjects had a mean MLU of 3.2347.

Years of observation and clinical research have posited the superior language development of girls, a view supported by this finding. It is of interest that sex differences are evident as early as two-years of age for this sample. Explanations for this difference include both genetic and environmental theories. Recent investigations of preschool language development reported by Lewis (1977) suggest the provocative possibility that mothers use language in distinctly different ways when interacting and conversing with their male versus female child. Lewis believes that mothers attempt to engage little girls in social conversation

more often than boys. Hence, girls are provided more frequent early opportunity to practice, and thereby develop, their language skills. Whatever the explanation, the results of the present study clearly do reflect a significant relationship between gender and language.

5. The causative factors underlying developmental delays and disorders continue to be subjects of speculations. Adverse prenatal, perinatal, as well as familial variables have been suggested as possible causative factors affecting later development. For these reasons, statistical procedures were completed to determine whether there was a relationship between obstetrical complications and behavior disorders or language delay. The relationship between positive family history and behavior disorders or language delay was evaluated by the use of *t*-tests. No statistically significant relationships were identified.

These findings of no relationships should be considered in the light of past empirical findings. Graham (1962) found that the effects of prenatal difficulties decreased over time, so that developmental delays and disorders had disappeared by school age. Hence, it is possible that the potential harmful effects of obstetrical complications had already disappeared by age two.

DeFries and Plomin (1979) support the view that genetic factors influence development. Eisenberg (1978) also belives that development is the result of "some predispositions intrinsic to the child" (p. 320). However, the findings of the

present study do not support a relationship between either a positive family history or learning and/or behavior problems or obstetrical complications and the selected developmental variables.

6. Significant gender differences have been noted in many investigations of childhood behavior disorders. It is, moreover, common knowledge among special educators that far more boys than girls are identified as having behavior disorders. Sex as a factor influencing behavior disorder was evaluated as a part of this study. Analysis of the data indicated no support for the assumption that sex is an influencing factor upon incidence of behavior disorders. No significant relationships were established between sex and any of the four behavior disorder scores of the Preschool Behavior Questionnaire (PBQ). Findings of the present study are not in agreement with the long-standing belief that boys exhibit more behavior disorders. Although boys are historically more frequently identified as behavior disordered, this may not necessarily mean that so many more boys than girls actually have these disorders. Safford (1978) states that girls "do indeed manifest 'acting out' problems" which are "more likely to be manifest, or at least identified, at puberty or during the adolescent years" (p. 160).

Most empirical studies investigating children's behavior disorders have not studied preschool children. Therefore, it is difficult to determine how generalizable findings concerning older children are to younger children. It is possible that during the early years of development there are no identifiable

sex differences in incidence and severity of behavior disorders. Disordered behavior may only become more apparent in the school setting, where most children first become labeled as behavior disordered.

It is interesting to note that Kelly and associates (1977) have found that female teachers generally perceived more children to be behavior disordered than did male teachers. It is possible that the present investigator, an experienced early childhood special educator, was able to rate the subjects' behavior without sexual bias.

Finally, the study sample may have been too small. If a larger population were investigated, sex differences might have emerged.

7. There is considerable interest in identifying those children who exhibit behavior disorders over time and across measures. The relationships between maternal ratings of children's level of activity at one year of age and PBQ scores at two years was tested using a t-test for differences between means. Aanalysis of the data indicated a positive significant relationship between maternal perception of hyperactivity and the present investigator's rating of hyperactivity at two years of age ($t(47) = .015$). No statistically significant relationship was found between one year hyperactivity and the other three PBQ scores.

Evidence is now available which indicates that many children identified as hyperactive early in life continue to have behavior and other life problems through adulthood. The

findings of the present study are in agreement with the findings from Battle and Lacey's (1972) reexamination of the Fels study data. They noted that "motor hyperactivity is relatively stable for the contiguous age period 0-3" (p. 767). The subgroups of children rated as hyperactive by both the mother at the one-year evaluation and the present investigator at two-years may comprise those children who can be characterized as "true" hyperactive children.

The importance of early symptoms can only be determined by a prospective longitudinal study (Chamberlin, 1977). The present investigation is part of such a research effort.

APPENDIX J

Resume

Name: Susan A. Chizner
Address: 5565 Columbia Pike Arlington, Virginia
Health Status: Excellent
Date of Birth: 5/31/53

I. Summary of Professional Experience

Evaluation and Placement
Division of Special Education
N.Y.C. Board of Education

Dates: 9/76-6/77

Title: Speech, Language, and Educational Evaluator
Responsibilities: Diagnostic evaluations, utilizing standardized and informal measurement, for interdisciplinary determination of educational placement and essential auxiliary services.

Bureau For Speech Improvement
Division Of Special Education
N.Y.C. Board Of Education

Dates: 9/74-6/76

Title: Speech and Language Therapist
Responsibilities: Diagnostic evaluations and therapy with the handicapped population exhibiting disorders of: language, voice, articulation, and fluency.
Supervision of graduate and undergraduate clinicians.

DeWitt Nursing Home
N.Y., N.Y.

Dates: 7/74-8/74

Title: Speech and Language Theraopist
Responsibilities; Evaluation and therapy with aphasic, dysarthric, hearing, and neurologically impaired adults.

Long Island University
Speech and Hearing Center
Brooklyn, N.Y.

Dates: 1/74-6/74

Title: Speech and Language Therapist
Responsibilities: Diagnostic evaluation and therapy with children and adults who exhibited a variety of speech and language disorders.

Department Speech Pathology and Audiology
Brooklyn V.A. Hospital
Brooklyn, N.Y.

Dates: 9/73-12/73

Title: Language Therapist
Responsibilities: Aphasia and post-laryngectomy therapy with adults

Department Speech Pathology and Audiology
Bronx V.A. Hospital
Bronx, N.Y.

Dates: 10/73-12/73

Title: Language Diagnostician
Responsibilities: Evaluation of linguistic functioning in aphasic patients.

Resume

Teachers College Speech and Hearing Center
Columbia University
N.Y.,N.Y. Dates: 9/73-7/74

Title: Speech and Language Therapist
Responsibilities: Speech and language therapy therapy with children and adults, Audiometric evaluations

Brooklyn College Speech and Hearing Center
Brooklyn, N.Y.

Dates: 9/72-6/73

Title: Speech and Language therapist
Responsibilities: Therapy with children and adults; audiometric testing.

II Membership in Professional Organizations

American Speech and Hearing Association
New York State Speech and Hearing Association
New York City Speech and Hearing Association
Council on Exceptional Children

III. Special Qualifications.

Certificate of Clinical Competency in Speech Pathology from A.S.H.A.
N.Y.S. and N.Y.C. permanent licenses in Speech and Hearing and Teaching theNeurologically and Emotionally Handicapped
Author of "The Listening Program"- a program of testing and improving auditory skills within the classroom
Extensive experience with educational and speech and language testing
Supervisory experience with graduate and undergraduate college students, including ongoing written evaluations

IV. Educational History

Institution	Dates Attended	Degree
Teachers College, Columbia University	9/73-7/74	M.S.
Hunter College, C.U.N.Y.	2/76-6/76	none-(ongoing coursework)
Brooklyn College C.U.N.Y.	9/69-6/73	B.A. cum laude departmental honors

APPENDIX K

Name of child _____ Study # _____

Date of Birth _____

Male 0 Female 1 — Sex ☐ 1.

Has X been seen by your family doctor, (general practitioner) in the past 12 months? What for? Anything else? How many times altogether? Reasons for visits (injuries, stitches)

No. of visits: None 0; 1-5 1; 6- 2; Don't know 9

General practitioner or Pediatrician ☐ 2.

Has X ever been an in-patient in hospital during the last year even for a night for an illness or accident? What for? When was this? Anything else? (Exclude birth unless kept in hospital for some neonatal condition. Code as for visits to G.P.)

Inpatient ☐ 3.

Reasons and ages at admission:
What about out-patients? (Exclude child Welfare Centres. Code as for visits to G.P.)
Reasons and ages at attendance:

Outpatient ☐ 4.

Has X had any wheezing attacks or asthma in the past 12 months?

No 0; Wheezing attacks 1; Asthma 2; No known 9 — ☐ 5.

(If asthma and wheezing attacks Code 2)
Describe:

Has X had any eczema or any other skin condition in the past 12 months?

No 0; Other skin condition 1; Eczema 2; Not known 9 — ☐ 6.

(If eczema and other condition Code 2) Any Allergies
Describe:

Has X ever had a seizure or convulsion?
When was this? When was the last time?

Age(s) when had seizure(s)

No fits 0; Possibly had fits 1; Has had fits 2; Not known 9 — ☐ 7.

Have there been any eating problems in the past 4 weeks like a very poor appetite?
Does X eat everything or is he/she fussy?

Poor appetite ☐ 8.

How often do you feel X isn't eating enough ...or isn't getting the right food?

Faddy eater ☐ 9.

No eating problems (include here the occasional missed meal or fad) 0
Some eating difficulties (has a few fads, or has a poor appetite for one meal a day or less) 1
Marked difficulties (appetite poor for at least half the meals: diet mainly milk and/or baby foods or candy and cookies, or eats only a few articles of food or refused practically all meat and/or vegetables 2
Don't know 9

Some children eat or drink unusual things which aren't food. Does X ever do this? Things like paper, coal, toys, dirt. How often in the past 4 weeks? ☐ 10.
Things eaten:

(Do not include things that are sucked like buttons; objects must be definitely chewed, eaten or drunk)
Never eats or drinks things not food 0
Sometimes eats things not food-twice a week or less 1
Frequently eats things not food-three times a week or more 2
Not known 9

Does X drink from a bottle during the day or before going to sleep or use training (beaker) cup?
Never drinks from bottle 0
Drinks from bottle but also uses cup 1 ☐ 11.
Uses bottle exclusively 2
Not known 9

Can X drink from a cup without help? Is it a full cup or must it be less than this?

Cup half full or more 0
Has to be helped or less than half full or uses beaker cup 1 ☐ 12
Unable to use cup 2
Given no opportunity to use 3
Not known 9

Can X use a spoon...and a fork? Are there any difficulties in using the spoon... or the fork?

		Spoon	☐ 13
Used with reasonable skill	0		
Difficulty in using	1	Fork	
Unable to use	2		☐ 14
Given no opportunity to use	3		
Not known	9		

Does X ever have attacks of vomiting? How often in the past 12 months? (1 attack: any vomiting occurring over a 24-hour period)
Never vomits 0
Less than 1 attack per month 1 ☐ 1
1 attack per month or more 2
Not known 9

In the past 4 weeks has X complained of any pains in the stomach...or the head...the arms or legs...anywhere else Stomach ache ☐ 1
How often is this?

(Include all complaints of pain even if child is thought to be pretending or asking for attention but not if this is reported

No complaint	0	Headache	17
Complains twice a week or less	1	Limb pains	18
Complains three times per week or more	2		
No speech	3	Other	19
Not known	9		

Description of pains:

Is X toilet trained yet? 1 Yes 2 No

Age started___ Age completed___

How long did it take? 0-2 weeks? 1
2 wks-1 month? 2
1-2 months? 3
Longer? 4

Has X had any bowel problems in the past 4 weeks like constipation? — Constipation ☐ 2

What about diarrhoea? — Diarrhoea ☐ 2

How often has X had an accident-soiled- in the past 4 weeks? — Soiling ☐ 2

And has X been wet at night or during the day? — Wetting in the day ☐ 2

How often?

None	0	Wetting at night	☐ 2
Twice a week or less	1		
Three times a week or more	2		
Not known	9		

What are the sleeping arrangements for X? Does he/she share a room? Or a bed?

Sleeps alone/own room	1		
Sleeps with parents/own bed	2		
Sleeps with parents/parents bed	3		
Sleeps with sibs/own bed	4		
Sleeps with sibs/shares bed	5	☐	
Shares bed with sibs in parents' room	6		
Any other sleeping arrangement/own bed	7		
Any other sleeping arrangement/ share bed	8		
Now known	9		

A lot of children don't like going to bed.
What about X?
What about going to sleep?
Does he sleep right through the night?
(What happens? How often does this happen? How long does it last?)

Going to bed going to sleep ☐

Waking at night ☐

No problem or problems less than once a week 0
Problem occurs 1-2 times a week only 1
Problem occurs 3 times a week or more and either takes more than 1 hour to get to sleep, or wakes more than once at night or for more than a few minutes, or goes into parents' room or bed 2
Not known 9

How often do you take X into your bed, or sleep in X's bed because X is upset?
Never sleep with child 0
Occasionally: all night once a week or less, of for a couple of hours only more often 1 ☐ 28
Frequently all or most of the night once a week or more 2
Not known 9

Does X have any habits before going to sleep or during the day?

What about....? Any others?

Scale A for individual habits
None 0
Sometimes: usually less than 20 mins a day 1
Frequently: usually more than 20 mins a day 2
Not known 9
Describe:

Headbanging ☐ 2

Rocking ☐ 3

Nervous movements like blinking, pulling faces, grinding teeth ☐ 3

Picking, pulling, scratching hair, skin or nails ☐ 3

Sucking thumb or fingers ☐ 3

Sucking other objects ☐ 3

Playing with own genital area ☐

Other ☐

Scale B for overall rating of habits
No habits 0
1-3 habits sometimes or 1 frequent habit 1 ☐
2 or more frequent habits, or 4 or more habits altogether 2

What is X saying now? Does he/she put words together?

Example of speech:

Phrases of 3 or more words 0
Single words 1
No recognizable words 2
Not known 9

☐ 3

How clear is his/her speech?
Do people outside the family understand it?
Does he/she have difficulty saying any sounds or letters?

☐ 3

Clear speech 0
Slight difficulty 1
Very difficult to understand 2
No speech or single words 3
Not known 9

Describe difficulty:

Does he/she ever stutter or stammer?
How bad is it? Severe: present nearly all the time, interferes markedly with communication.

No stammer 0
Slight stammer 1
Severe stammer 2
No speech or single words 3

☐

Are there any problems over hearing or seeing?
Describe:

Hearing ☐

Vision ☐

No problems 0
Possible problem 1
Definite problem 2
Not known 9

Does X ever have a squint in the eyes? (lazy eye, case, 2 eyes looking in different directions

☐

No squint 0
Possible squint 1
Definite squint 2
Not known 9

Can X use both arms and hands properly...and both legs?
Can X run? Do you think X is clumsy for his/her age?
In what way?

Upper limbs ☐

Lower limbs ☐ 45.

No problem	0
Appears markedly clumsy for age	1
Definitely handicapped	2
Not known	9

Describe:
How active is X? Is he/she the sort of child who doesn't like sitting still even for meals?
How many minutes will he/she sit at mealtimes usually?

Not markedly active	0
Very active	1
Hyperactive-sits still for meals or on other occasions usually less than 5 minutes	2
Not known	9

☐ 46

What kind of things does X like to play with indoors? Describe:

What's the longest time X will usually stick at one thing indoors if interested?

Concentrates usually for 15 mins or more	0
Concentrates usually for 5-14 mins or very variable	1
Concentrates usually never more than a few minutes	2
Not known	9

☐

Has he got any brothers or sisters?
How old are they?

	Sex	Date of Birth
1		
2		
3		
4		
5		

Number of children living in household ☐

Have they played well together in the past 4 weeks?
Do they squabble much? How much is playing together affected?
What about with other children?

(Check if present)

	Sibs	Peers	
Starts arguments or quarrels			48.
Gets teased, bullied, upset			49.
Seems shy, inhibited			50.
Ignores others			51.
Seems jealous			52.
Other			53.
			54.

Trivial or no difficulties 0
Some difficulties: play disrupted or prevented most times but only for short periods 1
Marked difficulties: play disrupted or prevented most of the time 2
No sibs/no opportunity to play with others 3
Not known 9

Sibs ☐ 55.

Peers ☐ 56.

Is X independent or does he/she cling a lot? Can X be left with people he/she knows? At home does X follow you around all day... keep asking for attention...ask to have things done which could do for self, e.g. in feeding or dressing ☐ 57.

Reasonably independent for age 0
Some dependency: upset if left, takes some time to get over it: sometimes demands undue attention 1
Marked dependency. Cannot be left at all, continually demands to be with mother, or continually asking for attention 2
Not known 9

In the past 4 weeks has X been easy to manage or difficult? Do you ever feel X is out of control or difficult to discipline? How often is this? ☐ 58.

Easy to manage and discipline 0
Sometimes difficult or out of control or hard to discipline for short periods 1
Long or very frequent periods, nearly every day, when difficult to manage or discipline 2
Not known 9

Does X have temper tantrums - shouting, screaming, banging, kicking? How often in the past 4 weeks. How long do they last?

No tantrums	0		
Brief tantrums lasting a few minutes, 1 or 2 a day	1	☐	59
Frequent tantrums 3 a day or more, or tantrums lasting more than 15 mins	2		
Not known	9		

Is his/her mood usually happy or more often miserable or irritable?
How has X been in the past 4 weeks?
How often does this happen?

Usually happy except for brief periods	0	☐	60
Sometimes miserable/irritable/ discontented for periods less than 1 hr on most days and/or for longer periods once or twice a week	1		
Frequently miserable/irritable on most days and/or for long periods 3 times a week or more	2		
Not known	9		

Is X a worrier?...Gets anxious about something that might happen?
What about if X loses something...if people are away from home...fails, accidents in self or others...upsetting stories on TV programmes... new experiences like holidays, a new teacher, changes in doing things?

		☐	61
Never or rarely worried	0		
Some worries for brief periods	1		
Many different worries, or worries over certain things for long periods	2		
Don't know	9		

(A worry is apprehension about something that may happen; a fear is apprehension about something thought to be present or actually present at the time)

Most children have some fears.
What is X afraid of? What about ...Anything else?
Describe fears:
What does X do?

Scale A for individual fears

Not afraid	0
Somewhat afraid: uncertain about approaching, requires reassurance	1
Marked fear: runs away or avoids, clings to adult, cries, has to be comforted	2
Not known or no contact	9

Dogs	☐	1
Cats	☐	2
Other animals/insects	☐	3
Thunder, loud noises	☐	4
The dark	☐	5
Strangers	☐	6
Going out	☐	7
Car, bus, train	☐	8
Elevators, escalators	☐	

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Water, the bath	☐	10
Haircut, hairwash	☐	11
Doctors	☐	12
Stories	☐	13
TV programmes	☐	14
	☐	15
	☐	16
	☐	17

Scale B for overall rating of fears
Is somewhat afraid of 1 or 2 things or has no fears 0
Has 1 or 2 marked fears or 3-5 fears altogether 1 ☐ 18

Is there anything about X's behavior or health we haven't mentioned?

Could you tell me what your husband's job is? ☐ 19
Father's occupation

Are you working? ☐ 20
Mother's occupation

That's all I wanted to ask. Thank you very much for your help.
Is there anything you'd like to ask me?

Informant:

Co-operation and reliability of informant

Good
Fair
Poor

Duration of interview ☐☐☐ minutes

COMMENTS

Name of interviewer_____

Date of interview_____

APPENDIX L

DEVELOPMENTAL SENTENCE ANALYSIS

Total Scores - Recording Form

Subject Number	Number of Utts.	NUMBER SINGLE WORDS						NUMBER 2-WORD COMBINATIONS						Number Const.	Number Sent.
		Total	Nouns	Desig.	Adj.	Verbs	Vocab.	Total	N.Phr.	Desg.	Pred.	Verb.	Frag.		

ENVIRONMENTAL LANGUAGE INVENTORY

Total Scores - Recording Form

SPONTANEOUS LANGUAGE SAMPLES

Subject Number	Length in Words		Semantic Grammatical Rules											Type of Response		
	T	I	A A	A O	AG O	M H P	M H R	M H A	N X	X L AO	X L AC	I X		I	C	S

STRUCTURED LANGUAGE TASKS

	Length in Words		Semantic Grammatical Rules										Refused Tasks
	T	I	A A	A O	AG O	M H P	M H R	M H A	N X	X L AO	X L AC	I X	
(c)													
(i)													